



# PRODUCT CATALOGUE







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# MELT FLOW MEASUREMENT





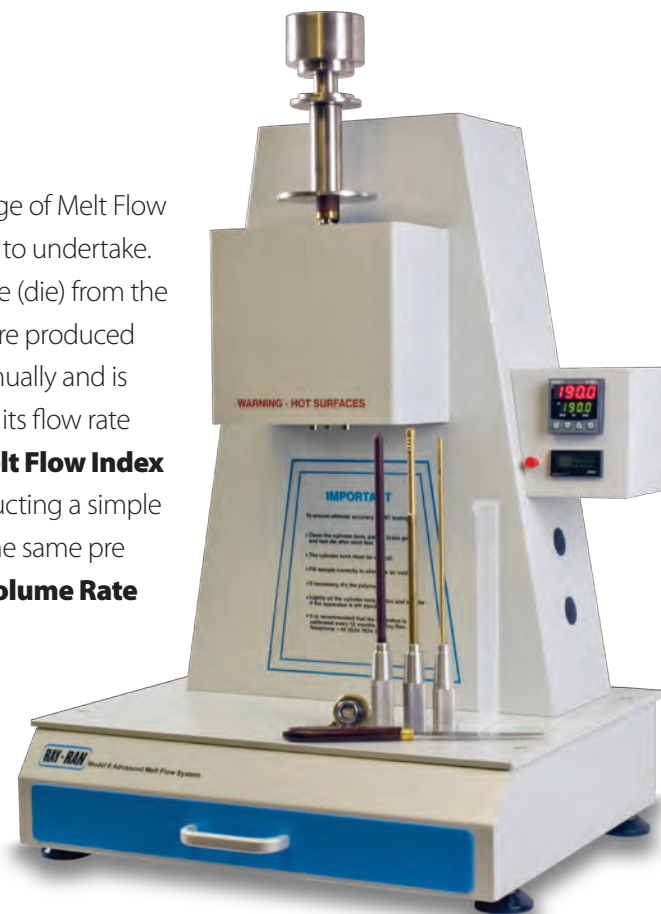
## 6 Series Manual Basic Melt Flow System

# MODEL 6MBA

The **6MBA** is the basic model offered within the Ray-Ran Range of Melt Flow Indexers. The manually operated test procedure is very simple to undertake. Molten Polymer is extruded through a closely controlled orifice (die) from the apparatus using pre set conditions of temperature and pressure produced by a dead weight system. The extruded polymer is cut off manually and is then weighed. Using the time interval to extrude the polymer its flow rate over 10 minutes can easily be determined, thus giving the **Melt Flow Index (MFI)** or **Melt Mass Flow Rate (MFR)** in g/10 min. By conducting a simple Density Test at test temperature on the same material using the same pre set conditions and a known piston travel distance the **Melt Volume Rate (MVR)** can also be determined.

The 6MBA Melt Flow System is supplied as standard with a replaceable hardened steel cylinder liner, standard test die and piston along with 2.16 kg test load and cleaning ancillaries. The temperature controller used is a 16th DIN type and displays the current temperature and set point and is accurate to 0.1°C. A PT100 Platinum Resistance Thermometer is used to accurately control the temperature of the barrel. The maximum allowable temperature variation along the length of the cylinder liner is in accordance with ISO1133 International Test Standard. An integrated timer is also fitted to accurately time the extrusion of the material in seconds to enable you to calculate the Melt Mass Flow Rate (MFR). All documentation is supplied including a product user manual and a fully traceable calibration certificate.

Optional weights can be supplied to cover all testing parameters to International Test standards and for the heavier weights the optional weight loader can fitted to the apparatus for ease in loading the piston. The weight loader can also be used as a



hold back feature for materials which have a high flow rate.

**Please be aware that this machine has no computer connectivity or file capture software functionality.**

Although the MFR value is not a fundamental property of the polymer, it does however, give an indication of the flow characteristics of the polymer and it has become one of the most widely used references for the quality control of polymers. The machine is available in either 220-240v 50hz or 110v 60hz.

## TECHNICAL SPECIFICATION

- Digital Temperature Controller
- Large Twin Colour Display
- Easy Set Point Operation
- Temperature Accurate to  $\pm 0.1^{\circ}\text{C}$
- Temperature Range 0 to  $400^{\circ}\text{C}$
- Temperature Resolution  $\pm 0.01^{\circ}\text{C}$
- Digital Timer - Large easy to read display
- Count Range - 1 second to 99999 hours 59 seconds (8 character display)
- Test Die, Piston & 2.16kg Test Weight supplied as standard
- Filling and cleaning tools included as standard
- Conforms to method A of the ASTM standard
- Electrical characteristics: 110v@60hz and 220v@50hz – fuse rating: 10amp

## OPTIONAL ANCILLARIES:

- Weight Loader
- Full Range of Test Weights Available from 1Kg to 21.6Kg
- Hastalloy cylinder, liner and die for corrosive materials

## WEIGHTS & DIMENSIONS: MODEL 6MBA

Net Weight (kg)	35	Please note that shipping weights will increase if heavy test weights are included.  For a complete set of test weights add approximately 30 kg to the weight.
Width (cm)	57	
Depth (cm)	58	
Height (cm)	70	



## TECHNICAL SPECIFICATION

- Microprocessor Temp Control
- Dual Zone Heating
- Temperature Accurate to +/- 0.1°C
- Temperature Range 0 to 400°C
- Temperature Resolution +/- 0.01°C
- Digital Encoder Accurate to +/- 0.02mm
- Multi slicing feature for accurate flow curve analysis
- Intuitive Menu Prompts
- Test Die, Piston & 2.16kg Test Weight supplied as standard
- Filling and cleaning tools included as standard
- Conforms to ASTM D1238, ASTM D3364, ISO 1133, DIN 53735 and others
- Electrical characteristics: 110v@60hz and 220v@50hz – fuse rating: 10amp
- **Techni-Test** software included as standard

## TESTING FEATURES

### MFI:

- Operator list
- Material reference list
- Batch ref with data input
- Variable test temp input
- Variable test weight input
- Variable pre-heat input
- Material density data input
- Variable test distance
- Multi slicing feature
- High and low limit parameter setting

### DENSITY:

- Operator list
- Material reference list
- Batch ref with data input
- Variable test temp input
- Variable test weight input
- Variable pre-heat input
- Variable test distance
- Numeric input of material weight in grams
- Automatic calculation of Density at test temperature

## OPTIONAL ANCILLARIES:

- Weight Loader Option
- Full Range of Test Weights Available from 1Kg to 21.6Kg

## WEIGHTS & DIMENSIONS:: MODEL 6MPCA

Net Weight (kg)	42	Please note that shipping weights will increase if heavy test weights are included.  For a complete set of test weights add approximately 30 kg to the weight.
Width (cm)	57	
Depth (cm)	58	
Height (cm)	70	

Model 6 Advanced Microprocessor Controlled Melt Flow System with **Techni-Test** software

## MODEL 6MPCA

The **6MPCA** is the most advanced model offered within the Ray-Ran Range of Melt Flow Indexers. The operating procedure is very simple to undertake using its on board advanced microprocessor technology. The large liquid crystal display (LCD) provides simple on screen instructions reducing user error and the test parameters are easily entered via the alpha numeric membrane keypad. The apparatus can accurately determine results for **MFR**, **MVR** and **Density** at test temperature.

To conduct a test molten polymer is extruded through a closely controlled orifice (die) from the apparatus using user set test parameters of temperature and pressure produced by a dead weight system. Rotary encoder technology accurately determines piston displacement as the polymer is extruded and automatically starts the test when the piston is in the critical zone for testing.

Simple parameters are entered such as user names, material reference numbers and batch numbers which are stored in lists for future recall and results presentation. Other parameters which are user defined are multi slicing and hi – lo limits. The multi slicing feature of the 6MPCA makes flow curve analysis instantly recognizable when the results are downloaded to the supplied **Techni-Test Software**. The operator inputs data for the amount of slices to be made during the setup process and the microprocessor accurately records the MFR result at



each slice during the test. For quality control purposes the 6MPCA microprocessor can be set with High and Low limits which are clearly defined when the results are downloaded to a PC showing the user instantly if the material is a pass or fail.

If a materials density at test temperature is not known then a simple density test can be conducted by extruding molten polymer over a selected test distance, weighing the cut off and inputting the weight into the microprocessor. The density



result will be automatically calculated and stored for you to conduct your MFI test. After each test has been conducted the results are displayed on the LCD giving the MFI (g/10mins), Shear Stress (Pa), Shear Rate (1/sec), Viscosity (Pa/sec) and the Melt Volume Rate (cc/10min) which can then be downloaded via the on board RS232 connector or the Ethernet connection to Ray-Ran's dedicated **Techni-Test Software** where results are displayed in graphical and tabular form. CSV files of the results can also be saved which can be exported into other user programs for generating test reports. The apparatus can also be supplied with an optional thermal printer for easy results printout if the machine is not connected to a network or PC.

The 6MPCA Melt Flow System is supplied as standard with a replaceable hardened steel cylinder liner, standard test die and piston along with 2.16 kg test load and cleaning ancillaries. The apparatus has dual Zone heating technology to keep the maximum allowable temperature variation along the length of the cylinder liner in accordance with the International test standard ISO1133

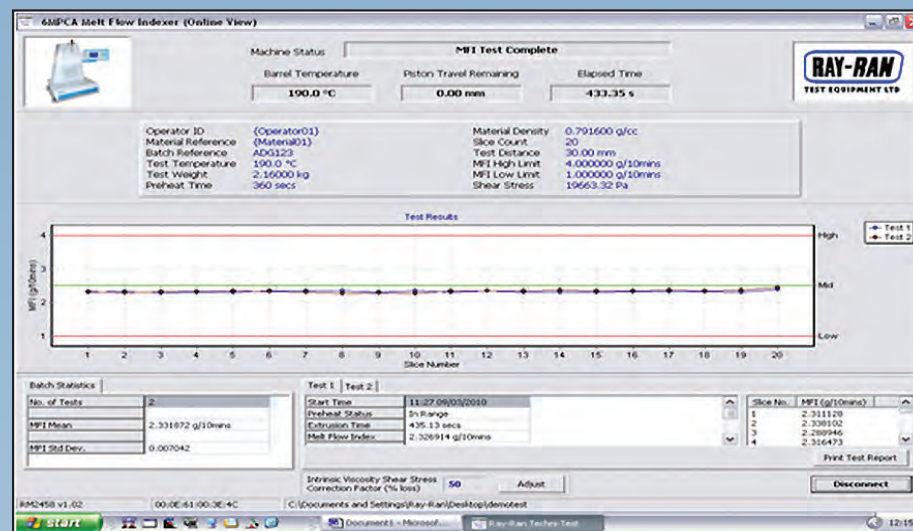
Optional weights can be supplied to cover all testing parameters to International Test standards and for the heavier weights the optional weight loader can fitted to the apparatus for ease in loading the piston. The weight loader can also be used as a hold back feature for materials which have a high flow rate. All documentation is supplied including **Techni-Test Software**, a product user manual and a fully traceable calibration certificate.

# ENTER THE WORLD OF TECHNI-TEST

**Techni-Test** is an easy to use software package supplied with the 6MPCA which allows the operator to monitor all aspects of the Melt Flow System during the test procedure.

To ensure reliable data analysis and results presentation test results are downloaded in graphical and tabular format. Each tabular result displays Extrusion Time, MFI, MVR, Shear Rate, Viscosity and Apparent IV (Intrinsic Viscosity) which is automatically calculated by the **Techni-Test** Software without the need for specialised equipment. Batch statistics such as Mean and Co-efficient of Variation (COV) are also displayed and are updated after each test result is downloaded. Test reports can be printed from the main screen when each test has been completed.

From the graph each multi-slice point is clearly identified giving accurate flow curve analysis of the material under test and by placing the cursor over each point the MFI value can be read on the screen. For Internal Quality Control Procedures at a glance, high and low limits are clearly displayed on the graph showing instantly if the material is a pass or fail. Multiple tests are clearly visible on the graph for results comparison within the batch and are highlighted in different colours for viewing.



In Test Results Viewer mode, users have the ability to upload saved results from previous tests for Material Comparison, Data Manipulation or File Export. Abnormal results caused by air pockets within the molten material for example are clearly identified and can be removed from the test data bringing the batch statistics into a normal range ensuring that the test procedure does not have to be repeated saving time and material. Exporting the results file in Viewer Mode is simple. The Export file format is .CSV and can be opened with Microsoft Excel.





**RAY-RAN**

# MOISTURE ANALYSERS





# BASIC MOISTURE ANALYSERS MB23 AND MB25

## Speed and Simplicity with Affordability

The **MB23** and **MB25 Basic Moisture Analysers** combine a high quality and durable ABS construction into a sleek, compact design and offer dependable, accurate results to quickly, effectively and affordably measure moisture content for a wide variety of applications.

Accurate results are provided on the custom built backlit LCD screen at either 0.01g or 0.005g readability depending on the model and come with heating elements of either infrared in the MB23 or halogen in the MB25 for moisture determination between 50°C and 160°C. Each Moisture analyser is ideal for textiles, wastewater, ceramics, food, and other applications.

Setup and operation is extremely easy. Simply press and hold the temperature or time buttons to set manual, automatic or timed duration drying parameters, add your sample and begin the test process. Results are displayed on the LCD at the end of the test as % moisture or % solids or weight (g), temperature and time and can be printed to an optional thermal printer via the onboard RS232 serial interface connection. This makes the MB23 and MB25 ideal for routine Quality Control tasks performed by operators of all skill levels.



Both the MB23 and MB25 moisture Analysers have a compact footprint of only 17 x 13 x 18cm and have both been designed to take up less space and their easy to clean heating chamber is operator friendly for routine, inexpensive maintenance. Both the MB23 and MB25 come with a 90mm diameter sample pan and have a 110g weighing capacity.

## BASIC MOISTURE ANALYSER (RR/MB23/25)

### TECHNICAL SPECIFICATION

#### MB23

- MB23 Repeatability (Std Dev) (g)  
0.3% for 3g sample/ 0.2% for 10g sample
- MB23 Readability 0.1% / 0.01g
- MB23 Infrared Heating

#### MB25

- MB25 Repeatability (Std Dev) (g)  
0.2% for 3g sample/ 0.05% for 10g sample
- MB25 Readability 0.05% / 0.005g
- MB25 Halogen Heating

### STANDARD ON BOTH

- Weighing Capacity 110g
- Sample size 3g to 20g typical, 0.5g minimum
- RS232 Interface
- Timer 1 – 99 minutes, 30 second increments to 60 minutes
- Temperature range 50°C – 160°C in 5°C increments
- Electrical characteristics 100 – 240 VAC, 50/60 Hz
- LCD backlit display
- 50 extra sample pans included as standard
- CE, CSA/UL and FCC approved
- Sample Pan Handler (not supplied with MB23)

### OPTIONAL ANCILLARIES

- Security Locking Cable
- Security Lock
- Temperature Calibration Kit
- 50g M1 Calibration Weight
- Sample Pans (80/Box)
- Glass Fibre Pads (200/Box)
- Reusable Sample Pan (3/Box)
- Sample Pan Handler (MB23 only)
- Thermal Printer EU
- Thermal Printer UK
- Cable
- Software

### WEIGHTS & DIMENSIONS: MODEL MB25

Net Weight (kg)	2.3
Width (cm)	17
Depth (cm)	28
Height (cm)	13

## TECHNICAL SPECIFICATION

- Weighing Capacity 35g
- Repeatability (Std Dev) (g) 0.10% for 3g sample/ 0.03% for 10g sample
- Readability 0.01% / 0.001g
- Moisture Range 0.01% - 100%
- RS232 Interface
- Timer 1 – 120 minutes, 30 second increments to 60 minutes, 1 min increments from 60 – 120 min
- Infrared Halogen Heating
- Temperature range 50°C – 160°C in 5°C increments
- Electrical characteristics 100 – 120 VAC, 50/60 Hz or 220 – 240 VAC, 50/60 Hz
- LCD backlit display 128 x 64 pixel.
- Displays % moisture, time, temperature and weight
- 1 off re-usable Stainless Steel sample pan included as standard
- CE, CSA/UL and FCC approved

## OPTIONAL ANCILLARIES

- Sample Pan Handler
- Security Cable
- Temperature Calibration Kit
- 20g ASTM Class 1 Calibration Weight
- Sample Pans (80/Box)
- Glass Fibre Pads (100/Box)
- Reusable Sample Pan (3/Box)
- Printer SF42-EU
- Printer SF42-GB
- Printer Cable
- Computer software

## WEIGHTS & DIMENSIONS: MODEL MB35

Net Weight (kg)	4.6
Width (cm)	19
Depth (cm)	35
Height (cm)	15

# MB35 ADVANCED MOISTURE ANALYSER

Designed to quickly, effectively and affordably measure moisture content, the **MB35** is the **Mid range Advanced model** offered within the Ray-Ran range of Moisture Analysers. Infrared Halogen heating with precision weighing technology gives a fast and accurate method for moisture content determination. The MB35 is perfect for applications in the pharmaceutical, chemical and research industries and is versatile and rugged enough for continuous operation in food and beverage, quality control, environmental and many other applications.



The MB35 features a maximum sample capacity of 35g with a readability of 0.001g and repeatability to 0.03% (10g sample). The Intuitive software of the MB35 uses a simple 3 key navigation process and a straightforward one step testing procedure. Accurate results are provided on the large 128 x 64 pixel backlit LCD screen at the end of the test as % moisture, actual weight (g), actual temperature and test time and can be printed to an optional thermal printer via the onboard RS232 serial interface or connected to a PC for use with optional dedicated software.

The MB35 Moisture Analyser is supplied as standard with Infrared halogen heating technology which begins the sample drying process in seconds. The uniquely designed gold reflective interior test area creates uniform distribution of heat to increase performance while decreasing test time with an operating temperature range from 50° to 160°C in 5° increments. The temperature settings are incrementally controlled by the software for test accuracy and the test area reaches full temperature within 1 minute. It has an easy to clean heating chamber which is operator friendly for routine, inexpensive maintenance

Manufactured to ISO 9001 quality assurance specifications the MB35 Moisture Analyser offers accuracy, repeatability and quality in a compact design.



# MB45 ADVANCED MOISTURE ANALYSER

The **MB45** Advanced Moisture analyser sets the standards in **high performance** moisture content determination and is the most advanced of all the moisture determination equipment offered by Ray-Ran.

The MB45 features a maximum sample capacity of 45g with a readability of 0.001g and repeatability to 0.015% (10g sample). It is supplied as standard with Infrared halogen heating technology which begins the sample drying process in seconds. An operating temperature range from 50° to 200°C in 1°C increments is achieved rapidly and the uniquely designed gold reflective interior test area creates a uniform distribution of heat to increase performance while decreasing test time.



serial interface or connected to a PC for use with optional dedicated software

## OTHER FEATURES INCLUDE

Four selectable automatic drying programs, four enhanced heating options and Statistical function for simple tracking and recording of standard deviation over time.

## For Optimum Performance the MB45 also features

### Unique Auto Shut-Off Options

The MB45 lets you choose from three pre-programmed end points for automatic test completion, custom design your own test end point criteria or select timed tests with audible signal when finished.

### Enhanced Heating Option

Choose from four pre-programmed heating options including: **Fast** – for quickest possible time to temperature; **Standard** – for minimal overshoot while achieving temperatures quickly; **Ramp** – for controlled ramping to temperatures and **Step** – set three temperatures for difficult samples.

## TECHNICAL SPECIFICATION

- Weighing Capacity 45g
- Repeatability (Std Dev) (g) 0.05% for 3g sample/ 0.015% for 10g sample
- Readability 0.01% / 0.001g
- Moisture Range 0.01% - 100% (0.01% - 1000% for regain mode)
- RS232 Interface
- Timer 1 – 120 minutes in 10 second increments
- Infrared Halogen Heating
- Temperature range 50°C – 200°C in 1°C increments
- Electrical characteristics 100 – 120 VAC, 50/60 Hz or 220 – 240 VAC, 50/60 Hz
- LCD backlit display 128 x 64 pixel.
- Displays % moisture, % solids, time, temperature, weight, test I/D, and drying curve.
- 1 off re-usable Stainless Steel sample pan included as standard
- CE, CSA/UL and FCC approved

## OPTIONAL ANCILLARIES

- Sample Pan Handler
- Security Cable
- Temperature Calibration Kit
- 20g ASTM Class 1 Calibration Weight
- Sample Pans (80/Box)
- Glass Fibre Pads (100/Box)
- Reusable Sample Pan (3/Box)
- Printer SF42-EU
- Printer SF42-GB
- Printer Cable
- Computer Software

## WEIGHTS & DIMENSIONS: MODEL MB45

Net Weight (kg)	4.6
Width (cm)	19
Depth (cm)	35
Height (cm)	15

**RAY-RAN**

# ANALYTICAL & PRECISION WEIGHING BALANCES





# PIONEER WEIGHING BALANCE

The **Pioneer** series of analytical and precision balances are designed for basic routine weighing in a variety of laboratory, industrial and education applications.

With the right combination of performance and features the Pioneer offers uncomplicated performance for all your basic weighing needs and includes parts counting and percentage weighing.

The integral up-front level indicator quickly ensures the

balance is level prior to use and to help adapt the balance to real life working conditions the Pioneer is designed with selectable environmental settings. When working in harsh environments, the balance can be adjusted to compensate for vibrations and other disturbances. Conversely, the balance can be adjusted for working in slow filling applications where sensitivity is a must.

## WEIGHING CAPACITIES

**Analytical** – 65g/0.1mg up to 210g/0.1mg available

**Precision** – 210g/1mg up to 4100g/0.1g available

## OTHER STANDARD FEATURES AND EQUIPMENT

AC adapter, user selectable span calibration points, software reset menu, stability indicator, Auto Tare, user selectable communications settings, user selectable printing options and stainless steel platform.

**The Pioneer can be supplied with OIML approval.**



## PIONEER: WEIGHING BALANCE

### TECHNICAL SPECIFICATION

- Weighing Capacity 65g up to 4100g
- Repeatability (g) 0.0001 up to 0.1
- Readability (g) 0.0001 up to 0.1
- Liquid Crystal Display (LCD)
- RS232 with GLP/GMP Data Output
- Rigid Metal/ABS construction
- Glass draft-shield with flip top door
- AC adapter included
- Multiple Application Modes
- Selectable Environmental Settings
- 18 selectable units of measurement (non OIML approved)

### OPTIONAL ANCILLARIES

- Thermal Printer
- Impact Printer
- Printer Cable
- Computer software
- Display cover
- Internal calibration
- Traceable Calibration Certificate

### WEIGHTS & DIMENSIONS: PIONEER

Net Weight (kg)	4.5
Width (cm)	20
Depth (cm)	32
Height (cm)	9.2

## TECHNICAL SPECIFICATION

- Weighing Capacity 110g up to 8100g
- Repeatability (g) 0.0001 up to 0.1
- Readability (g) 0.0001 up to 0.1
- 2-Line Liquid Crystal Display (LCD ) with Backlight
- RS232 with GLP/GMP Data Output
- Rigid Metal/ABS construction
- Glass draft-shield with flip top door
- AC adapter included
- Multiple Application Modes
- Selectable Environmental Settings
- 18 selectable units of measurement (non OIML approved)

## OPTIONAL ANCILLARIES

- Thermal Printer
- Impact Printer
- Printer Cable
- Computer software
- Display cover
- Internal calibration
- Traceable Calibration Certificate

ADVENTURER  
WEIGHING BALANCE

The **Adventurer** is one of the industry's most versatile balances – it counts, it sums, it holds and it delivers traceable results.

With a full range of **Analytical** and **Precision models**, no other balance in its class offers all these features in a compact design. Internal calibration ensures weighing accuracy by allowing you to calibrate the balance prior to use without the need of external weights and the environmental settings offer three filter modes and adjustable zero tracking which are ideal for working in slow filling applications where sensitivity is a must. When working in harsh environments, the user can adjust balance settings to compensate for vibrations

and other disturbances. All Adventurer models come with a **built-in RS-232 serial interface**, and with **full GLP/GMP data output**, it is sure to meet all your traceability and compliance requirements.

## OTHER FEATURES INCLUDE

**Dynamic Weighing Mode** – Allows the user to weigh small animals and filters out animal movements to provide a stable weight indication

**Parts Counting with Optimisation** – Allows the user to count based on a calculated piece weight. With optimisation, counting accuracy is improved through auto re-calculation of the piece weight

**Percentage Mode** – Allows the user to display the weight of a sample as a percentage of a reference weight

**Check weighing Mode** – Allows the user to check the weight of a sample against a preset target

**Totalization Mode** – Allows the user to sum a series of sample weights

**Display Hold Mode** – Allows the user to hold the highest stable weight on the display until cleared

## WEIGHING CAPACITIES

**Analytical** – 110g/0.1mg up to 260g/0.1mg available

**Precision** – 210g/1mg up to 8100g/0.1g available



## WEIGHTS &amp; DIMENSIONS: ADVENTURER

Net Weight (kg)	4.4
Width (cm)	22
Depth (cm)	30
Height (cm)	7.2

The Adventurer can be supplied with OIML approval.



# EXPLORER WEIGHING BALANCE

The **Explorer** series of analytical and precision balances has established itself as market leader in its class.

A compact design, the Explorer delivers accurate results within seconds improving operator efficiency, productivity and throughput, with a stabilisation time up to **50% faster than basic models**. Its superior anti-vibration system makes the Explorer **ideal for unstable working conditions**. It is supplied with a frameless, flip top anti-static glass draft-shield which provides unobstructed access to the working chamber. Simple prompts using icons on the **large colour VGA display** make navigating the menus easy and the resistive touch screen display quickly responds to the operators touch or stylus.

Also included on the Explorer is a four point touch-less sensor for total hands free operation and the internal calibration procedure ensures accuracy is maintained even if ambient room temperatures effect the weighing accuracy. Test results can be downloaded via the onboard RS232 serial interface connector direct to Excel or to an optional thermal printer.

## OTHER FEATURES INCLUDE

Qwerty keyboard and numeric keypad, 14 built in applications, 11 operating languages, NTEP and OIML models available,



menu lock switch, security bracket, integral weigh below hook for below balance weighing applications, removable stainless steel weighing platform, stability indicator, overload and under load indicators, auto standby Weighing (17 units + custom units), Parts Counting, % weighing, Animal/Dynamic Weighing, Check weighing, Filling, Totalization, Formulation, Differential weighing, Density determination, Peak hold, Ingredient costing, Pipette adjustment, Gross/Net/Tare Weighing

**The Explorer can be supplied with OIML approval.**

## EXPLORER: WEIGHING BALANCE

### TECHNICAL SPECIFICATION

- Weighing Capacity 120g up to 10200g
- Repeatability (g) 0.0001 up to 0.1
- Readability (g) 0.0001 up to 0.1
- Auto Calibration
- RS232 Interface & USB
- Display Size 5.7 in / 145 mm (diagonal)
- Display Full-colour VGA graphic display, 4-wire resistive touch screen
- Electrical characteristics AC Adapter Input: 100-240 VAC 0.6A 50-60 Hz
- CE, CSA/UL and FCC approved
- 18 selectable units of measurement (non OIML approved)

### OPTIONAL ANCILLARIES

- Thermal Printer
- Impact Printer
- Printer Cable
- Ethernet Interface Connector

### WEIGHTS & DIMENSIONS: EXPLORER

Net Weight (kg)	6.9
Width (cm)	23
Depth (cm)	39
Height (cm)	36

## TECHNICAL SPECIFICATION

- Analytical Weighing Capacity up to 110g up to 310g
- Analytical Repeatability (g) 0.0001
- Analytical Readability (g) 0.0001
- Semi Micro Weighing Capacity up to 81g up to 210g
- Semi Micro Repeatability (g) 0.00001 – 0.0001
- Semi Micro Readability (g) 0.00001 – 0.0001
- Auto Calibration
- RS232 Interface with full GLP/GMP Protocol
- Display Size 4 x 1 / 10 x 2.5
- 2-line Alphanumeric Backlit LCD Display
- External Adapter, 100-120VAC 150mA, 220-240VAC 100mA, 50/60Hz
- CE, CSA/UL and FCC approved
- 18 selectable units of measurement (non OIML approved)

## OPTIONAL ANCILLARIES

- Thermal Printer
- Impact Printer
- Printer Cable
- Ethernet Interface Connector
- Computer Software
- Dust Cover
- Anti Theft Device

## WEIGHTS &amp; DIMENSIONS: DISCOVERY

Net Weight (kg)	10.2
Width (cm)	20
Depth (cm)	46
Height (cm)	30

DISCOVERY  
WEIGHING BALANCE

The **Discovery** weighing Balance is the professional's choice when it comes to weight measurement.

It features a rigid construction and an advanced internal calibration system offering the performance you would expect to find only in premium-priced balances. A compact design, the Discovery Pro delivers accurate results within seconds improving operator efficiency and productivity. The easy to use balance software utilizes text prompts to guide users through applications and balance setup. Delivered through a 2-line backlit LCD display and clearly marked buttons, the Discovery Pro tells you what is going on and what you have to do next. It is supplied with a frameless, flip top anti-static glass draft-shield which provides unobstructed access to the working chamber. To minimize weighing errors and ensure accurate measurements, two internal weights are used to perform the internal linear calibration procedure which automatically calibrates the balance when it senses a temperature change significant enough to affect the weighing accuracy. The balance features a rear mount load cell for ultimate, accuracy and isolation.



The Discovery's repeatability and linearity performance is 2x better than most semi-micro balances in its class. Made from a glass and steel construction it resists the effects of static and corrosion increasing balance stability and accuracy, as well as extending product life.

## OTHER FEATURES INCLUDE

Selectable environmental filters, protective in-use cover, integral weigh below hook, easy to use keypad, up-front level indicator, stability indicator, mechanical and software overload/under load protection, AC adapter, user selectable span calibration points, auto tare, user selectable printing options, user selectable communications settings, user selectable data print options, user definable project and user ID's, software reset menu, software lockout menu

## WEIGHING FEATURES

Weighing, Parts Counting with Automatic Sample Recalibration, Percent Weighing, Check weighing, Animal/Dynamic Weighing, Gross/Net/Tare Weighing, Totalization, High Point, Density, Statistics and Pipette Calibration

**The Discovery can be supplied with OIML approval and is offered in analytical and semi-micro versions.**





Discovery

0.00000g

Tare

On/Zero  
Off

Print  
Unit

YES

NO

Func.  
Menu

Cal  
Menu

Tare

BACK

Exit



RAY-RAN

# AUTO DENSITY GRADIENT APPARATUS

3 COLUMN DGA & 6 COLUMN DGA (RR/DGA)

## AUTO DENSITY GRADIENT APPARATUS

The **Auto Density Gradient Apparatus** from Ray-Ran has become the world's benchmark for accurate density measurement of small solid specimens using the column method. Offered as a **3 or 6 column version**, the built in on-board Microprocessor System accurately calculates the specimen's density more quickly and more accurately by using the latest linear encoder technology that measures the samples position in the column relative to the calibrated glass marker floats. Once the correct position of the sample is recorded the density is displayed on the LCD screen.

To ensure results accuracy the Density Gradient Apparatus is supplied with digital temperature control to ensure the temperature of each column is at  $23^{\circ}\text{C} \pm 0.1^{\circ}\text{C}$ . For ambient temperatures in excess of  $23^{\circ}\text{C}$  the integrated cooling coil can be used in conjunction with an optional water chiller unit so the correct temperature can be maintained.

To build each glass column with a fluid of a known density range a variable speed peristaltic pumped filling system is supplied with the apparatus. Column filling speeds are variable from 0.5ltrs/hr to 1.5ltrs/hr to keep the gradient accurate. The density range of the column is formed by mixing two fluids having different densities in the supplied glass flasks.



# RAW MATERIAL EVALUATION

The resulting solution has a density which when introduced into the column increases uniformly from top to bottom. Calibrated glass marker floats of precise known densities are introduced into the column and sink to a point where the density matches that of the solution.

A linear encoder which is attached to a trammel guide is used to calibrate the gradient of the column by focusing the optical microscope onto the centre of the calibrated float and entering the floats density value into the microprocessor. Once test samples have been introduced into the column and have reached a point of static equilibrium they are accurately sighted using the microscope. The resultant density of the sample is obtained and displayed on the LCD without the need for complicated graphs. Test results can be downloaded via the RS232 serial interface connector to an optional thermal printer.

To remove the samples and glass marker floats simply turn on the automatic sweep mechanism and wait for the items to be extracted from each column. Particles and floats are removed at a slow speed so the gradient of each column is not

damaged by the sweep basket. To replace the floats and new samples into the column simply reverse the sweep motor and lower them into the column.

The Gradient of the column can be calibrated & checked at any time as the calibration procedure stores the values in the microprocessor ensuring that density values of your samples remain accurate to the column. If the density gradient of the column changes at any time the column can be quickly re-calibrated saving time or the necessity to create a new gradient for the column. Depending on use or age the density distribution of the column can remain stable for up to 40 weeks.



## 3 COLUMN DGA & 6 COLUMN DGA (RR/DGA)

### TECHNICAL SPECIFICATION

- Automatic density calculation
- Automatic calibration system
- LCD display
- Resolution 0.0001 g/ml
- Accuracy 0.0001 g/ml
- Backlight
- Variable speed pumped filling system
- Twin conical filling flasks
- Automatic magnetic stirrer
- Automatic sweep mechanism
- Stainless steel sweep baskets
- 7x optical microscope
- Digital temperature control to 0.1°C
- RS232 output
- Cooling coil
- 110v 60hz and 240v 50Hz
- Product user manual
- Traceable calibration certificate
- CE declaration certificate
- 1 year return to base warranty
- Conforms to ISO1183 & ASTM D1505

### OPTIONAL ANCILLARIES

- Thermal Printer
- Water chiller unit
- Glass marker floats 0.7g/ml up to 2.2g/ml
- Microprocessor controlled filling system

### WEIGHTS & DIMENSIONS: AUTO DENSITY GRADIENT APPARATUS

	3 COLUMN DGA	6 COLUMN DGA
Net Weight (kg)	70	80
Width (cm)	85	120
Depth (cm)	40	40
Height (cm)	110	110

## TECHNICAL SPECIFICATION

- Small footprint filler unit with basic operating panel
- LCD display
- Fully programmable column volume, and upper and lower densities
- More accurate and consistent than other filling methods
- Variable speed pumped filling system
- No need to premix liquids
- g/ml or kg/m<sup>3</sup> units
- Variable top and bottom buffer volumes
- Previous stored filling routines
- Automatic density calculation
- Mains lead
- 5mtrs of 4mm tubing supplied
- Weighted end for the outlet tube
- Spare pump tubes & connectors
- 110v - 240v 50 – 60Hz
- Product user manual
- CE declaration certificate
- 1 year return to base warranty
- Product user manual

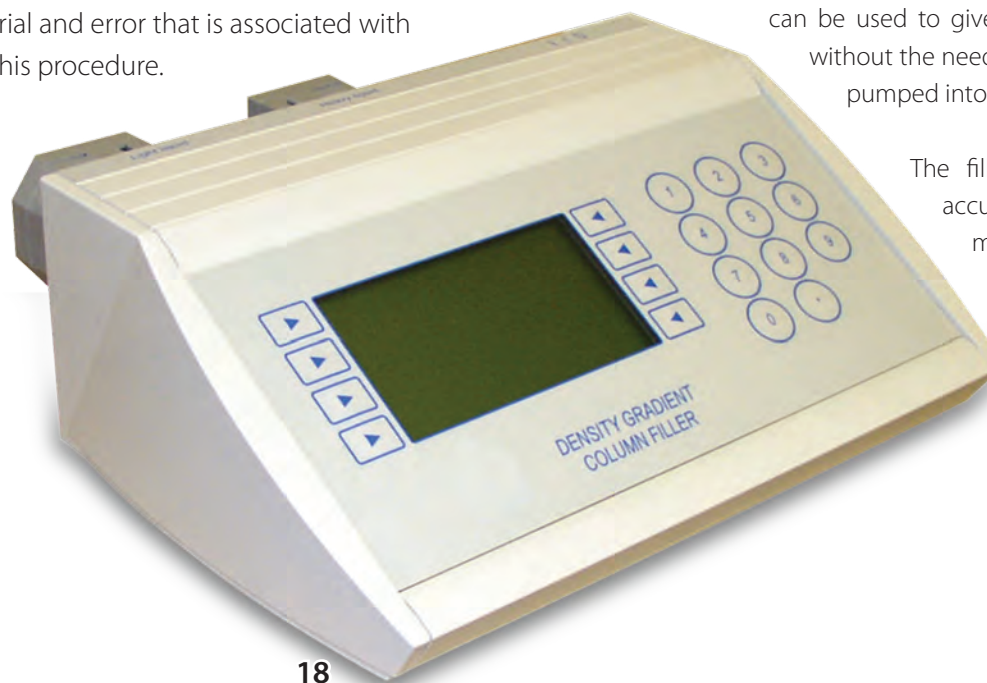
# MICROPROCESSOR CONTROLLED DENSITY GRADIENT FILLING SYSTEM

The **Microprocessor Controlled Filling System** offered by Ray-Ran is by far the most accurate way of producing a density gradient within your column. Not only does it effortlessly integrate with the **Ray-Ran 3 and 6 column equipment** but can also be used with any other make of density gradient column. It saves considerable time in the preparation and building of your density gradient and overcomes a lot of the trial and error that is associated with this procedure.

Buffer zones can be added to the top and bottom of the column to slow down the deterioration of the column and gradient settings can be stored for future use including controlled top and bottom densities, column volume, tube volume and buffer volumes as well as selectable density units, with either g/ml or kg/m<sup>3</sup> available.

The filling procedure is fully automated using indexing stepper motors and peristaltic pumps and any two miscible liquids can be used to give the heavy and light densities without the need to be pre-mixed prior to being pumped into the column.

The filling system is a faster, more accurate and more consistent method of building a density gradient column increasing time and productivity.



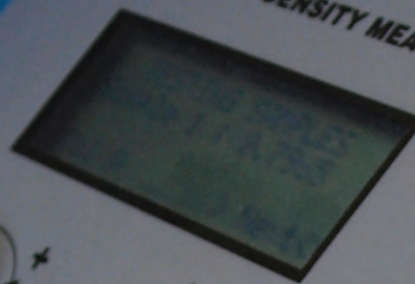
## WEIGHTS &amp; DIMENSIONS: RR/DGA/CFS

Net Weight (kg)	5.3
Width (cm)	32
Depth (cm)	25
Height (cm)	11



**RAY-RAN**

ADVANCED AUTO DENSITY MEASUREMENT



select



**RAY-RAN**

TEST EQUIPMENT

SWEEP



SWEEP



BACKLIGHT



STIRRER



**IMP**  
Please ensure  
tank is filled to  
for one, two or  
switch



**RAY-RAN**

# APPARENT BULK DENSITY





# APPARENT BULK DENSITY

**Bulk density** is a property of powders, granules and other “divided” solids, especially used in reference to mineral components (soil, gravel), chemical substances, (pharmaceutical) ingredients, foodstuff or any other masses of corpuscular or particulate matter. It is defined as the mass of many particles of the material divided by the total volume they occupy. The total volume includes particle volume, inter-particle void volume and internal pore volume.

Bulk density is not an intrinsic property of a material; it can change depending on how the material is handled. For example, a powder poured into a cylinder will have a particular bulk density; if the cylinder is disturbed, the powder particles will move and usually settle closer together, resulting in a higher bulk density. For this reason, the bulk density of powders is usually reported both as “freely settled” (or “poured” density) and “tapped” density (where the tapped density refers to the bulk density of the powder after a specified compaction process, usually involving vibration of the container.)

## ASTM D1895 METHOD A

Primarily used to measure the apparent density of fine granules that can be poured readily through a “V” shaped funnel, the material under test is allowed to flow into a cylindrical cup with a known volume of 100cm<sup>3</sup>.

### TESTS THAT CAN BE CONDUCTED ARE:

- Apparent Density
- Bulk Factor
- Pourability



## ASTM D1895 METHOD B

The larger of the ASTM family Method B is primarily used to measure the apparent density of larger coarse granular materials, dice or pellets that cannot be poured readily through the method A funnel. The material under test is allowed to flow into a cylindrical cup with a known volume of 400cm<sup>3</sup>.

### TESTS THAT CAN BE CONDUCTED ARE:

- Apparent Density
- Bulk Factor
- Pourability



## ASTM D1895 METHOD A & METHOD B

### ASTM D1895 METHOD A TECHNICAL SPECIFICATION

- Conforms to ASTM D1895 method A
- V shaped funnel
- Measuring cup 100cm<sup>3</sup>
- Stand with funnel shut off

#### WEIGHTS & DIMENSIONS: ASTM D1895 A

Net Weight (kg)	4
Width (cm)	18
Depth (cm)	23
Height (cm)	25

### ASTM D1895 METHOD B TECHNICAL SPECIFICATION

- Conforms to ASTM D1895 method B
- V shaped funnel
- Measuring cup 400cm<sup>3</sup>
- Stand with funnel shut off

#### WEIGHTS & DIMENSIONS: ASTM D1895 A

Net Weight (kg)	9
Width (cm)	24
Depth (cm)	33
Height (cm)	52

## ASTM D1895 METHOD C TECHNICAL SPECIFICATION

- Conforms to ASTM D1895 method C
- Measuring funnel
- Weight plunger
- Lead shot

### WEIGHTS & DIMENSIONS: ASTM D1895 C

Net Weight (kg)	4
Width (cm)	10
Depth (cm)	10
Height (cm)	30 (max)

## ISO METHOD R60 TECHNICAL SPECIFICATION

- Conforms to ISO R60 specification
- Measuring cup 100cm<sup>3</sup>
- Stand with funnel shut off

### WEIGHTS & DIMENSIONS: ISO METHOD R60

Net Weight (kg)	4
Width (cm)	18
Depth (cm)	23
Height (cm)	25

**RAY-RAN**

## ASTM D1895 METHOD C

For course flakes, strands, chips and cut fibres that cannot be poured using test methods A and B Ray-Ran offer a measuring cylinder and plunger to method C of the ASTM test standard. Since these types of materials to be tested are very bulky when loosely poured and are usually compressed to lessen the bulk, a measure of their density under a small compression load is very useful. For this test a measuring cylinder of 1000 cm<sup>3</sup> is supplied along with a scaled weight plunger with 1mm graduations on the outside. Lead shot is used to increase the plunger weight to 2300g to compress the material under test.

### TESTS THAT CAN BE CONDUCTED ARE

- Apparent Density



## ISO METHOD R60

Primarily used to measure the apparent density of moulding material that can be poured readily through a specified funnel, the material under test is allowed to flow into a cylindrical cup with a known volume of 100cm<sup>3</sup>.

### TESTS THAT CAN BE CONDUCTED ARE

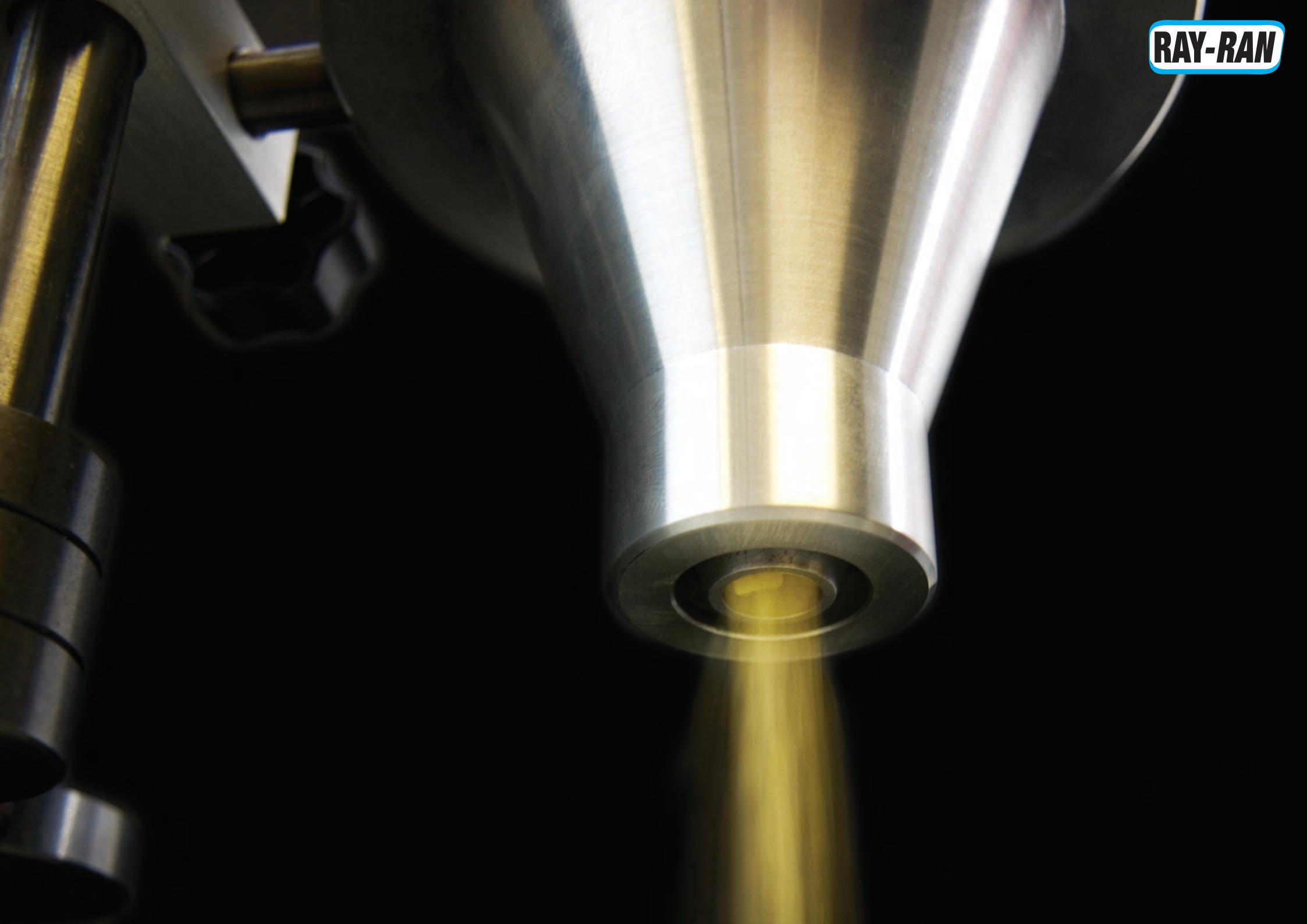
- Apparent Density
- Bulk Factor
- Pourability



**OTHER  
MODELS ARE  
AVAILABLE  
ON REQUEST**

**PLEASE CONTACT  
RAY-RAN FOR MORE  
INFORMATION  
REGARDING YOUR  
SPECIFIC REQUIREMENT**





# DENSITY BALANCES





# ADVENTURER PRO DENSITY DETERMINATION BALANCE

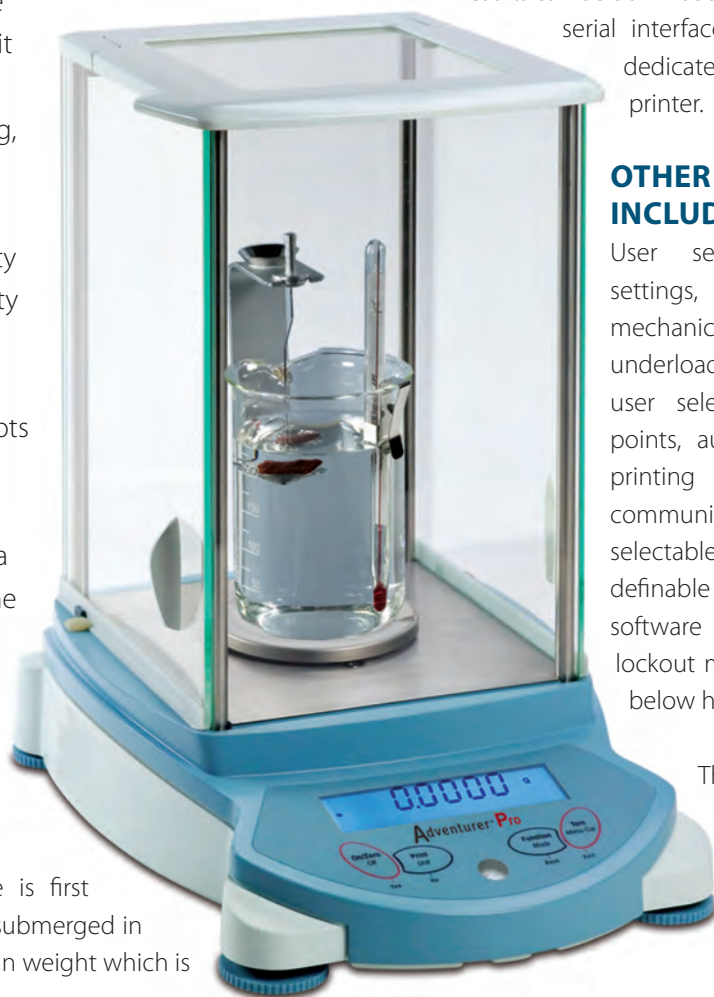
The **Adventurer Pro Analytical Series Density Determination Balance** has established itself as one

of the industry's most versatile balance's. A compact design, it is supplied with a metal base and ABS shell, ABS top housing, glass draft-shield with flip top door and replaceable in-user cover. It determines the density of fluids and the specific gravity of solid materials by using the

**Archimedeian Buoyancy Method.** Simple menu prompts with large backlit 2-Line liquid crystal display make the equipment user friendly with a display resolution at 0.1mg. The internal calibration system ensures weighing accuracy allowing you to calibrate the balance prior to use without the need of external weights.

To conduct a test the sample is first weighed in air and again when submerged in a liquid. By determining the loss in weight which is

directly proportional to the mass of the fluid it has displaced, the specific gravity and density is readily calculated. Test results can be downloaded via the onboard RS232 serial interface connector to optional dedicated PC software or thermal printer.



## OTHER FEATURES INCLUDE

User selectable environmental settings, stability indicator, mechanical and software overload/underload protection, AC adapter, user selectable span calibration points, auto tare, user selectable printing options, user selectable communications settings, user selectable data print options, user definable project and user ID's, software reset menu, software lockout menu and integral weigh-below hook.

The Adventurer Pro is an essential, cost effective tool for Laboratory and Quality Control environments.

## ADVENTURER PRO DENSITY BALANCE

### TECHNICAL SPECIFICATION

- Weighing Capacity up to 260g
- Repeatability (g) 0.0001
- Readability (g) 0.0001
- 2-Line Liquid Crystal Display (LCD) with Backlight
- RS232 with GLP/GMP Data Output
- Rigid Metal/ABS construction
- Glass draft-shield with flip top door
- AC adapter included
- Multiple Application Modes
- Selectable Environmental Settings

### OPTIONAL ANCILLARIES

- Thermal Printer
- Impact Printer
- Printer Cable
- Computer software
- Internal Self Calibration

### WEIGHTS & DIMENSIONS: ADVENTURER PRO

Net Weight (kg)	4.4
Width (cm)	22
Depth (cm)	30
Height (cm)	30.5

## TECHNICAL SPECIFICATION

- Weighing Capacity up to 320g
- Repeatability (g) 0.0001
- Readability (g) 0.0001
- Auto Calibration
- RS232 Interface & USB
- Display Size 5.7 in / 145 mm (diagonal)
- Display Full-colour VGA graphic display, 4-wire resistive touch screen
- Electrical characteristics AC Adapter  
Input: 100-240 VAC 0.6A 50-60 Hz
- CE, CSA/UL and FCC approved

## OPTIONAL ANCILLARIES

- Thermal Printer
- Impact Printer
- Printer Cable
- Ethernet Interface Connector

## WEIGHTS &amp; DIMENSIONS: EXPLORER PRO

Net Weight (kg)	6.9
Width (cm)	23
Depth (cm)	39
Height (cm)	36

## EXPLORER PRO DENSITY DETERMINATION BALANCE

The **Explorer Pro Analytical Series Density Determination Balance** has established itself a market leader in its class. A compact design, the Explorer Pro delivers accurate results within seconds improving operator efficiency, productivity and throughput, with a stabilisation time up to 50% faster than basic models.

Its superior anti-vibration system makes the Explorer Pro ideal for unstable working conditions. It is supplied with a frameless, flip top anti-static glass draft-shield which provides unobstructed access to the working chamber. Simple prompts using Icons on the large colour VGA display make navigating the menus easy and the resistive touch screen display quickly responds to the operators touch or stylus. Also included on the Explorer Pro is a four point touchless sensor for total hands free operation and the internal calibration procedure ensure accuracy to 0.1mg is maintained even if ambient room temperatures affect the weighing accuracy.

The Explorer Pro accurately determines the density of fluids and the specific gravity of solid materials by using the Archimedeian Buoyancy Method. To conduct a test the sample is first weighed in air and again when submerged in a liquid. By determining the loss in weight which is directly proportional to the mass of the fluid it has displaced, the specific gravity and density is readily calculated. Test results can be downloaded via the onboard RS232 serial interface connector direct to Excel or to an optional thermal printer.

## OTHER FEATURES INCLUDE

Qwerty keyboard and numeric keypad, 14 built in applications, fully-automatic internal calibration system, fast stabilization time, four touchless sensors, up to 11 operating languages, NTEP and OIML models available, menu lock switch, security bracket, integral weigh below hook for below balance weighing applications, removable stainless steel weighing platform, stability indicator, overload and underload indicators, auto standby.

The Explorer Pro is an essential, cost effective tool for Laboratory and Quality Control environments.





# DISCOVERY PRO DENSITY DETERMINATION BALANCE

## The **Discovery Pro Density Determination Balance**

is the professional's choice when it comes to measuring density. The Discovery Pro features a rigid construction and an advanced internal calibration system offering the performance you would expect to find only in premium-priced balances.

A compact design, the Discovery Pro delivers accurate results within seconds improving operator efficiency and productivity. The easy to use balance software utilizes text prompts to guide users through applications and balance setup. Delivered through a 2-line backlit LCD display and clearly marked buttons, the Discovery Pro tells you what is going on and what you have to do next. It is supplied with a frameless, flip top anti-static glass draft-shield which provides unobstructed access to the working chamber. To minimize weighing errors and ensure accurate measurements, two internal weights are used to perform a linear calibration. The internal calibration system automatically calibrates the balance when it senses a temperature change significant enough to affect the weighing accuracy.



The Discovery Pro provides users with four methods of density determination to choose from depending on their need. They are:

1. Determine density for solids more dense than water
2. Determine density for solids less dense than water
3. Determine density for liquid density (sinker needed – not included)
4. Determine density for Porous material (impregnated with oil).

After entering a couple of parameters into the balance, the built in density table and mass measurement of the balance take over to provide rapid and accurate density results, with no manual calculations needed.

## OTHER FEATURES INCLUDE

Selectable environmental filters, protective in-use cover, integral weigh below hook, easy to use keypad, up-front level indicator, stability indicator, mechanical and software overload/underload protection, AC adapter, user selectable span calibration points, auto tare, user selectable printing options, user selectable communications settings, user selectable data print options, user definable project and user ID's, software reset menu and software lockout menu.

## DISCOVERY PRO DENSITY BALANCE

### TECHNICAL SPECIFICATION

- Weighing Capacity up to 310g
- Repeatability (g) 0.00001
- Readability (g) 0.00001
- Auto Calibration
- RS232 Interface with full GLP/GMP Protocol
- Display Size 4 x 1 / 10 x 2.5
- 2-line Alphanumeric Backlit LCD Display
- External Adapter, 100-120VAC 150mA, 220-240VAC 100mA, 50/60Hz
- CE, CSA/UL and FCC approved

### OPTIONAL ANCILLARIES

- Thermal Printer
- Impact Printer
- Printer Cable
- Ethernet Interface Connector
- Computer Software
- Dust Cover
- Anti Theft Device

### WEIGHTS & DIMENSIONS: DISCOVERY PRO

Net Weight (kg)	10.2
Width (cm)	20
Depth (cm)	46
Height (cm)	30

# CNC SAMPLE PROFILER





# CNC1 SAMPLE PROFILE CUTTER

Designed and manufactured by Ray-Ran the **Model 1 CNC Sample Profile Cutter** is rapidly becoming the best bench top milling machine in its class.

The 3 axis rapid prototyping vertical milling machine is ideal for cutting hard dense polymer sheets and laminates up to 40mm thick as well as polyethylene and polypropylene pipes that are used within the gas and water industry. The versatility of the machine makes it ideal for Research and Development departments, Laboratories and Universities.

The **CNC1** comes with a bed size of 500mm x 440mm which has tennon slots for clamping down the sample. Travel distances on the X, Y and Z axis are 300mm x 250mm x 100mm respectively and are fitted with high quality lead screws and linear guide rails for precision and accuracy. The high speed spindle is variable from 2400 rpm to 24000 rpm and has a milling cutter capacity of up to 10mm diameter. Cutting feed ranges up to 1100mm/min can be achieved for a fast accurate milling process with each axis driven and controlled by advanced stepper motor technology. Pipe work is supplied as standard for air cooling to reduce the cutter temperature when machining components and the machine can also be fitted with dust extraction. The fully enclosed cabinet has an internal light and an electrical safety interlock to ensure operator safety when the cabinet door is in the open position.



For work holding, a standard clamping kit can be supplied or bespoke clamping fixtures can be designed and manufactured by Ray-Ran to meet customer's requirements.

The **CNC1** is supplied with **Flashcut CNC** software which is a dedicated real-time CNC program for use on a PC or Laptop. It interfaces effortlessly with the machine and uses industry standard numerical control G-Code and Letter addresses for programming. **Pre-written CNC programs are available direct from Ray-Ran** for any shape or size of test sample or to any International test standard.

## SAMPLE PROFILE CUTTER (RR/CNC1)

### TECHNICAL SPECIFICATION

- 300mm x 250mm x 100mm XYZ axis (approximate)
- 500 mm x 440 mm table size
- High Quality 0.5KW Router Spindle
- Variable spindle speeds from 2400 rpm to 24000 rpm
- High quality guide rail and lead screw system
- Positional homing switches
- Total enclosure safety cabinet for user protection
- Internal lighting
- Emergency Stop Button
- Computer interface with cabling and Windows™ **Flashcut CNC** PC software
- Low cost CNC programs available to any International test standard
- 220-240 volts 1 ph 50 Hz
- Uses industry standard G & M codes
- Product user manual
- CE declaration certificate
- 1 year return to base warranty

### OPTIONAL ANCILLARIES

- Tooling and clamping kit
- Pipe clamping fixture
- Single flute tungsten carbide milling cutters
- Pre-written CNC programs
- Dust extraction
- I/O spindle expansion board
- Auto tool change system & tool rack
- CAD/CAM software

### WEIGHTS & DIMENSIONS: RR/CNC1

Net Weight (kg)	110
Width (cm)	98
Depth (cm)	60
Height (cm)	70

### TECHNICAL SPECIFICATION

- 600mm x 300mm x 175mm XYZ axis (approximate)
- 910 mm x 480 mm table size
- High Quality 1.5KW Router Spindle
- Variable spindle speeds from 2400 rpm to 24000 rpm
- High quality guide rail and lead screw system
- Positional homing switches
- Total enclosure safety cabinet for user protection
- Internal lighting
- Emergency Stop Button
- Computer interface with cabling and Windows™ **Flashcut CNC** PC software
- Low cost CNC programs available to any International test standard
- 220-240 volts 1 ph 50 Hz
- Uses industry standard G & M codes
- Product user manual
- CE declaration certificate
- 1 year return to base warranty

### OPTIONAL ANCILLARIES

- Tooling and clamping kit
- Pipe clamping fixture
- Single flute tungsten carbide milling cutters
- Pre-written CNC programs
- Dust extraction
- I/O spindle expansion board
- Auto tool change system & tool rack

### WEIGHTS & DIMENSIONS: RR/CNC2

Net Weight (kg)	150
Width (cm)	123
Depth (cm)	83
Height (cm)	83

# CNC2 SAMPLE PROFILE CUTTER

The **Model 2 CNC Sample Profile Cutter** designed and manufactured by Ray-Ran is the ultimate bench top 3 axis vertical milling machine used for Test Sample Preparation and 3D rapid prototyping.

It has set new standards for cutting hard dense polymer sheets and laminates up to 100mm thick as well as polyethylene and polypropylene pipes that are used within the gas and water industry. The versatility of the machine makes it ideal for Research and Development departments, Laboratories and Universities.

Totally enclosed for operator safety the **CNC2** comes with a bed size of 910mm x 480mm which has tennon slots for clamping down the sample. Travel distances on the X, Y and Z axis are 600mm x 300mm x 175mm respectively and each slide way is fitted with high quality lead screws and linear guide rails for precision and accuracy. Cutting feed ranges up to 2500mm/min can be achieved for a fast accurate milling

process with each axis driven and controlled by advanced stepper motor technology. Homing switches are fitted as standard to each axis so machine and program co-ordinates can be set easily on a day to day basis ensuring accuracy and repeatability especially if you are using a static clamping fixture for your machining process.

The compact, high torque 1.5KW high speed router spindle which is fitted has a variable speed range from 2400 rpm to 24000 rpm and has a milling cutter capacity of up to 16mm diameter when fitted into industry standard ER25 collets.

The Router's spindle speed is controlled via the control panel dial as standard or the optional spindle I/O expansion board so it becomes fully functional using the **Flashcut CNC** operating software. With this option,





## TEST SAMPLE PREPARATION

spindle speeds can be set within the G-Code program file and spindle on/off functions selected using specified M-codes. High quality custom made single flute tungsten carbide cutters ensure a superior finish on any machined sample.

To compliment the machine a full clamping kit can be supplied for standard work holding and machining applications. For more specialised work such as machining thick tensile test pieces from industrial polyethylene pipe samples, bespoke work holding fixtures can be designed, manufactured and supplied by Ray-Ran to meet customer's requirements.

Pipe work is supplied as standard for air cooling to reduce the cutter temperature when machining components and the machine can also be fitted with dust extraction. The fully enclosed cabinet has an internal light and an electrical safety interlock to ensure operator safety when the cabinet door is in the open position.

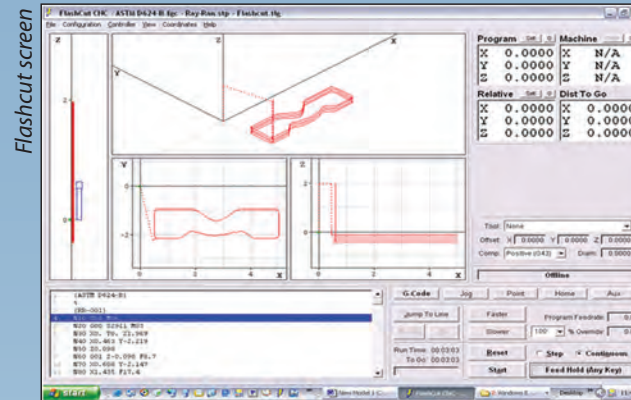
The **CNC2** is supplied with **Flashcut CNC** operating software which is a dedicated real-time CNC program for use on a PC or Laptop. It interfaces effortlessly with the machine and uses industry standard numerical control G-Code and letter addresses for programming. Pre-written CNC programs are available direct from Ray-Ran for any shape or size of test sample or to any International test standard.

If you require a larger machine than the CNC2, Ray-Ran can design, develop and manufacture bespoke alternatives to customer's individual needs. Feel free to contact us to see if Ray-Ran can meet your requirements.

FLASHCUT CNC PC SOFTWARE

**RAY-RAN**

## REAL-TIME CNC CONTROL IN A FLASH



**Flashcut CNC** is a dedicated software package which gives high performance low cost CNC results, and is supplied as standard with both models of the Ray-Ran **CNC Sample Profile Cutter**. Effortlessly integrated between machine and PC, Flashcut CNC uses standard numerical G-Code and Letter Addresses for real time CNC control.

The **Flashcut CNC** software has an easy to use, yet powerful operator control panel that puts all of the machine control you need at your fingertips. It has been meticulously engineered to work seamlessly with 64 and

32 bit versions of Windows based operating systems without changing sensitive operating system parameters. It dynamically displays the tool path while sending real time motion commands to the **CNC's** Signal Generator over a high speed USB connection for smooth, dependable, accurate motion on most PC's or Laptops. The system has been designed to accept industry standard G & M codes ensuring full compatibility with leading professional Computer Aided Design and Computer Aided Manufacturing software (CAD/CAM).

For the experienced user of Computer Aided Design software such as AutoCad, simple 2D drawings can be imported into the software as .DXF files using the **Flashcut CNC's** Import feature. Once simple set up parameters are configured the software will generate a simple G-Code program to machine the part. If you have CAM software, programs generated by your Post Processor can also be imported as .FGC files direct to the **Flashcut** software, the program will then generate the cutter path in the viewports on the main control panel.

For the novice, pre-written CNC programs are also available direct from Ray-Ran for any shape or size of test sample to any International test standard, eliminating the need for CAD/CAM trained operators or skilled CNC programmers.

### TECHNICAL SPECIFICATION

- Easy to use main screen and control panel
- Program list box
- G-code program editor
- Feedrate override selector
- Step and continuous run modes
- Digital readout display inc. Program, Machine
- Relative and Distance to Go co-ordinates
- Full 5-axis support
- Tool life management system

- Very accurate runtime estimate
- Configuration wizard
- Advanced contouring
- Multi-screen viewports
- DXF import
- Tool path generator
- Cycle program creator including, Face Milling, Pocketing,
- Engraving, Hole Patterns and Custom
- Cutter compensation feature

- Main screen display units (english/metric)
- All G-Code and M-Code variables catered for
- G-Code teach box

### MIN PC REQUIREMENT

- 1 GHz or faster processor
- 1 GB of RAM
- Windows XP, Vista or 7 either 32 or 64 bit
- At least 1 available USB port



# TEST SAMPLE INJECTION MOULDING

The Ray-Ran **Test Sample Injection Moulding Apparatus** has been specifically designed to produce a wide variety of laboratory test samples such as colour plaques, tensile and impact test specimens as well as small components required for mechanical testing procedures. The unique low cost moulding machine has a compact design for vertical bench mounting making the apparatus ideal for Research and Development Institutes, Universities, laboratories and small workshops.

The apparatus is pneumatically operated with inlet air pressures up to 10 bar (150 psi) which is adequate for moulding most materials including Polypropylene, Polyethylene and PET with injection pressures up to 450 bar (6500 psi)

Digital temperature control up to 400°C melts the polymer which is then extruded into the mould. Digital tool block heating is included for more efficient polymer flow into the mould with temperatures up to 200°C to prevent freezing.

The apparatus is supplied with a quick release cam operated tool block which will accept low cost tool inserts machined to any shape that will fit within the standard tool block parameters. This makes the apparatus ideal if different samples

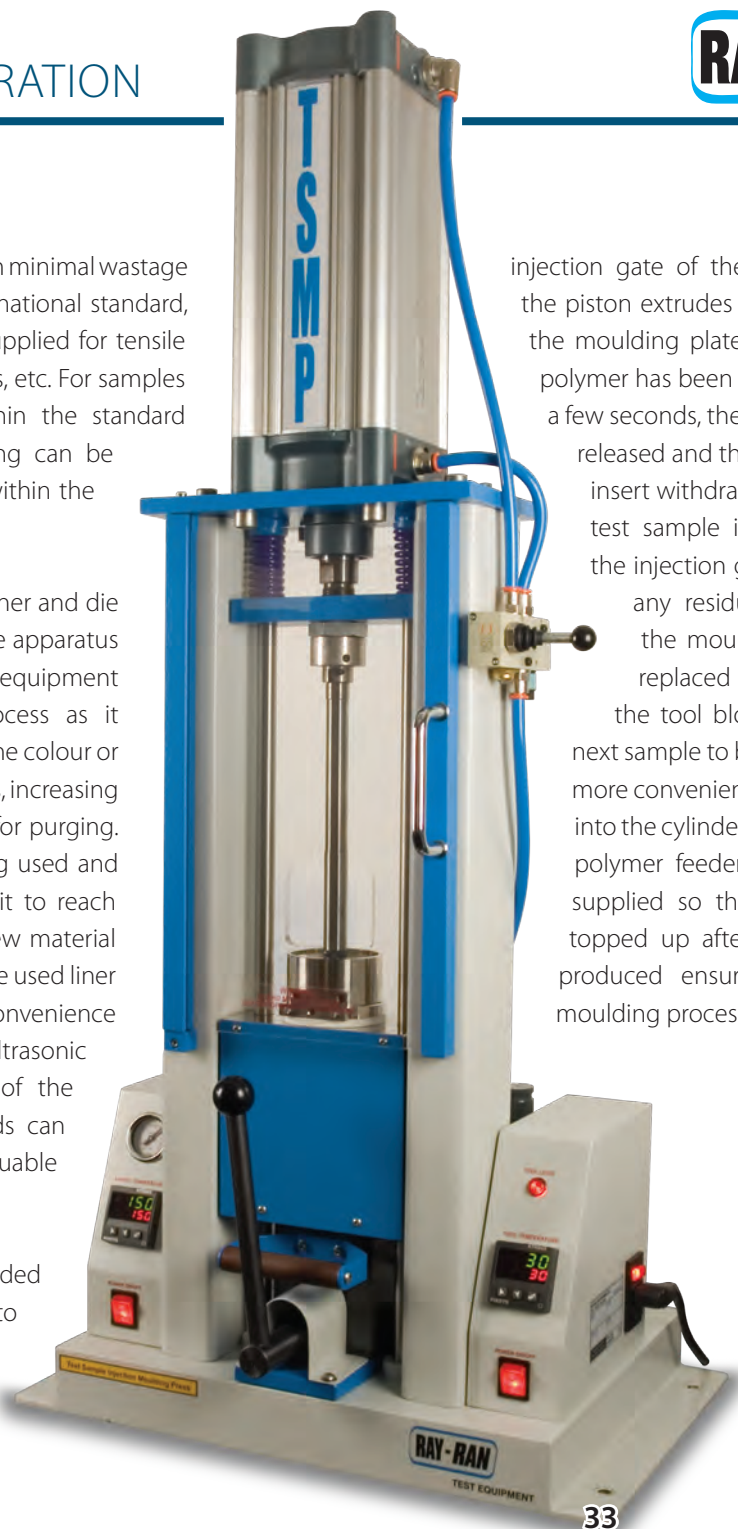


## TEST SAMPLE PREPARATION

are required from the same material with minimal wastage and time. Tool Inserts to suit any international standard, e.g. ASTM, ISO, DIN, JIS, etc., can be supplied for tensile dumbbells, colour plaques, impact bars, etc. For samples that cannot be easily moulded within the standard tool block, optional specialised tooling can be supplied to customers requirements within the parameters of the machine.

The unique interchangeable cylinder liner and die assembly supplied as standard with the apparatus compliments the simplicity of the equipment during and after the moulding process as it enables the operator to change from one colour or material to another in just a few seconds, increasing production and eliminating the need for purging. Simply remove the cylinder liner being used and replace it with a clean one, wait for it to reach temperature, fill the liner with your new material and continue the moulding process. The used liner can then be cleaned at the operator's convenience using a dedicated cleaning solution or ultrasonic cleaning bath. The 47cm<sup>3</sup> capacity of the cylinder liner ensures multiple moulds can be made saving time and reducing valuable material wastage.

To mould a test sample, polymer is loaded into the top of the liner which is heated to the required temperature to plasticise the polymer. When the injection piston is released, the cylinder liner nozzle automatically locks into the



injection gate of the tool block and the piston extrudes the polymer into the moulding plate insert. After the polymer has been allowed to set for a few seconds, the tool block cam is released and the moulding plate insert withdrawn. The moulded test sample is then removed, the injection gate is cleaned of any residual polymer and the moulding plate insert replaced and clamped in the tool block ready for the next sample to be moulded. For a more convenient flow of polymer into the cylinder liner, an optional polymer feeder hopper can be supplied so the liner is always topped up after each mould is produced ensuring a countless moulding process.

**RAY-RAN**

## INJECTION MOULDING (RR/TSMA)

### TECHNICAL SPECIFICATION

- Pneumatically operated
- Maximum air line pressure: 150 psi/10 bar
- Maximum polymer pressure: 6500 psi/450 bar
- Maximum shot size: 47cm<sup>3</sup>
- Maximum sample sizes 175mm (L) x 45 (W) x 12.7 (T)
- Digital Temperature Control
- Automatic nozzle-to-tool locking device.
- Cam-lock Tool Block
- Quick Change Cylinder, Nozzle & Die
- Visual alarms for tool locking
- 110v 60hz and 240v 50Hz
- Product user manual
- Traceable calibration certificate
- CE declaration certificate
- 1 year return to base warranty

### OPTIONAL ANCILLARIES

- Polymer Feeder Hopper
- Low cost moulding inserts available to all international standards
- Quick Change Cylinder, Nozzle & Die
- Air compressor
- Non standard tool block

### WEIGHTS & DIMENSIONS: RR/TSMA

Net Weight (kg)	55
Width (cm)	52
Depth (cm)	36
Height (cm)	111

**RAY-RAN**

# TEST SAMPLE CUTTING PRESSES





# HAND OPERATED TEST SAMPLE CUTTING PRESS

Specifically designed to cut test samples such as tensile bars from relatively flexible sheet, the **Ray-Ran Hand Operated Test Sample Cutting Press** will produce samples from plastics, fabrics, boards and paper. In most cases, the thickness of the material that can be cut will not just depend on the strength of the material, but also on the lateral flexibility of the material to allow the cutter to penetrate down into, and pass through the material.

The press is supplied with a cutting base of 30cm x 15cm and a polypropylene cutting board to support the material the sample is to be cut from. Four fixing holes in the base plate enable the press to be securely fastened to a rigid bench or worktop to obtain the optimum cutting load. To ensure maximum performance, the cutter must be set up relative to the cutting board so that at full stroke, the cutter will just depress the surface of the cutting board.

The fixing arbour on the press will accept a 25mm dia cutting tool shank as standard. Other size fixing arbours can be supplied to customer requirements.

The Ray-Ran Hand Operated Cutting Press can generate a cutting force of up to 6kN depending on the strength of the operator.



## HAND CUTTING PRESS (RR/HCP)

### TECHNICAL SPECIFICATION

- Hand operated
- 30cm x 15cm sample platform
- Cutting force up to 6kN
- Polypropylene cutting board
- Adjustable cutting arbor with locking handle
- Suitable for rubber, plastic, paper, fabric or laminates
- Product user manual
- CE declaration certificate
- 1 year return to base warranty

### OPTIONAL ANCILLARIES

- Test sample cutters to any International standard
- Traceable calibration certificate (cutters only)
- Polypropylene cutting board

### WEIGHTS & DIMENSIONS: RR/HCP

Net Weight (kg)	15
Width (cm)	30
Depth (cm)	25
Height (cm)	50

### TECHNICAL SPECIFICATION

- Pneumatically operated up to 10 bar (150 psi)
- Automatically operated
- Polycarbonate guard
- Cutting force up to 50KN
- 25cm x 15cm sample platform
- Polypropylene cutting board
- Adjustable cutting arbor with locking handle
- Suitable for rubber, plastic, paper, fabric or laminates
- Product user manual
- CE declaration certificate
- 1 year return to base warranty

### OPTIONAL ANCILLARIES

- Test sample cutters to any International standard
- Traceable calibration certificate (cutters only)
- Polypropylene cutting board

### WEIGHTS & DIMENSIONS: RR/PCP

Net Weight (kg)	72
Width (cm)	30
Depth (cm)	30
Height (cm)	63

# PNEUMATICALLY OPERATED TEST SAMPLE CUTTING PRESS

### The **Pneumatically Operated Test Sample Cutting**

**Press** is by far the most effortless and safest way to produce cut samples from materials such as plastics, fabrics, boards and paper. The press is robust and compact using a limited amount of space and is ideal for any laboratory or workshop without the need to be bolted to a bench or worktop.

The cutting process is simply done by pulling the protective polycarbonate screen in a downward direction and letting the press do the rest, generating cutting forces up to 50 KN (depending on the input pressure) to easily cutting through sheet materials such as polypropylene and polyethylene up to 8mm thick.

The press is supplied with a cutting base of 25cm x 15cm and a polypropylene cutting board to support the material the sample is to be cut from. A polycarbonate safety guard which will not allow the machine to operate unless it is in the closed position, ensures operator safety. To deliver maximum performance, the cutter must be set up relative to the cutting board so that at full stroke, the cutter will just depress the surface of the cutting board.



The fixing arbour on the press will accept a 25mm dia cutting tool shank as standard. Other size fixing arbours can be supplied to customer requirements.

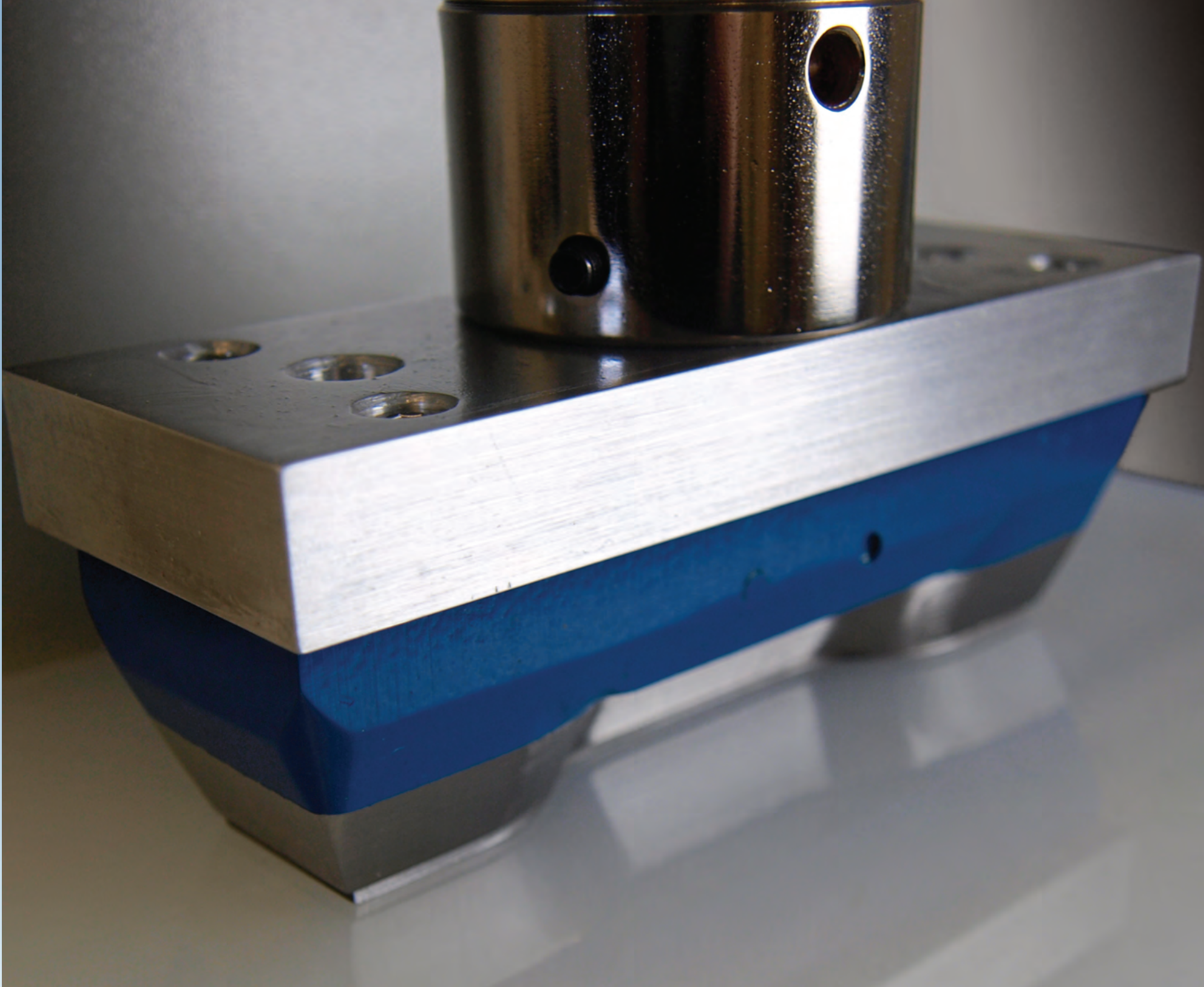
In most cases, the thickness of the material that can be cut will not just depend on the strength of the material, but also on the lateral flexibility of the material to allow the cutter to penetrate down into, and pass through the material.







# TEST SAMPLE CUTTERS





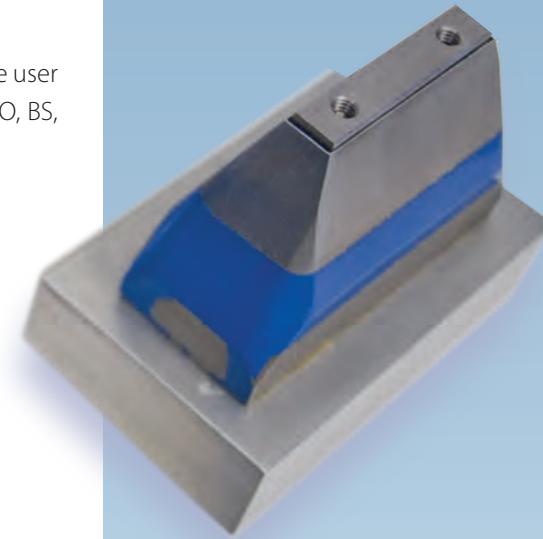
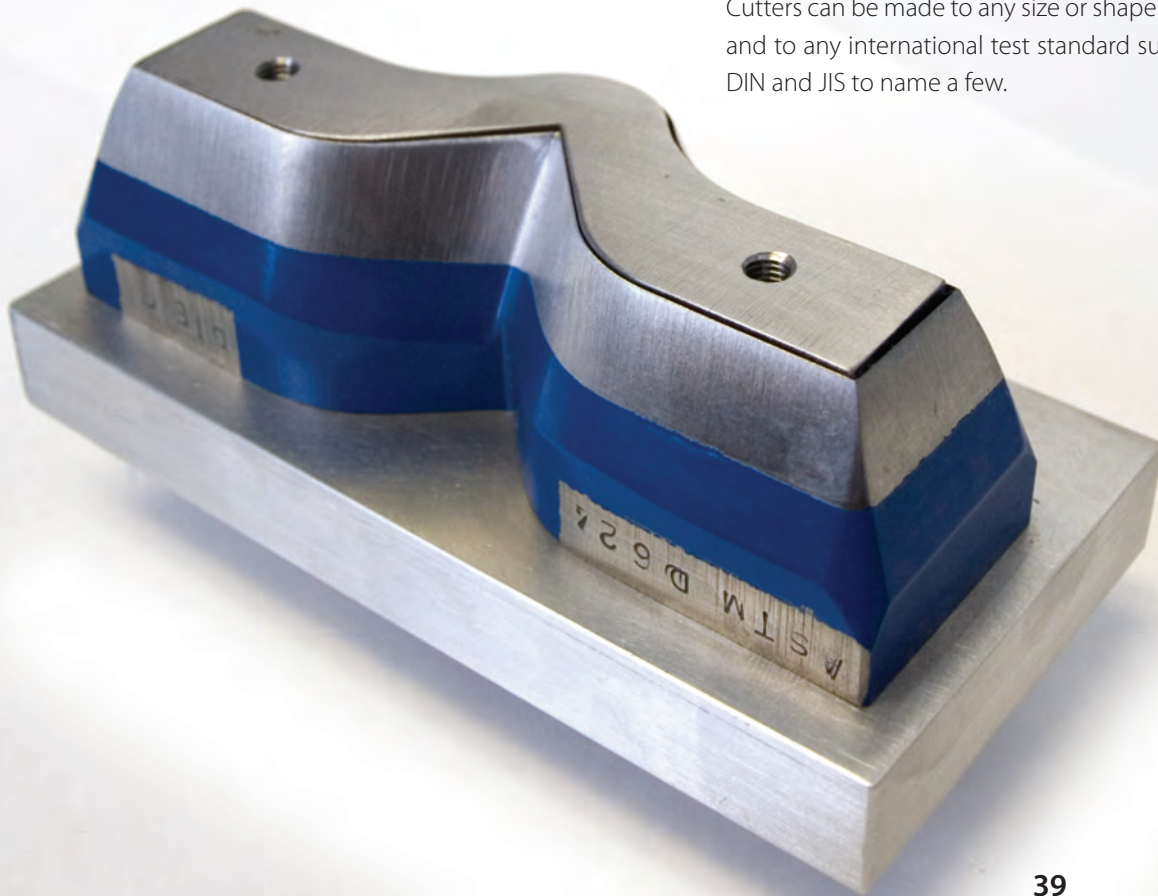
# TEST SAMPLE CUTTERS

Ray-Ran's **Test Sample Cutters** are manufactured from high grade D3 tool steel to give long lasting cutting edge sharpness for repeatable test specimens and more accurate test results.

The cutters are heat treated several times during the manufacturing process to remove machining stresses and

are diamond lapped finished for increased cutting edge wear resistance. The cutters come complete with a spring loaded ejection system to remove the cut sample from the cutter and also protect the cutting edges. A standard fixing shank to suit the Ray-Ran range of presses is fitted to the cutter but non standard shanks can be manufactured to suit customer's individual requirements.

Cutters can be made to any size or shape required by the user and to any international test standard such as ASTM, ISO, BS, DIN and JIS to name a few.



## TEST SAMPLE CUTTERS (RR/TSC)

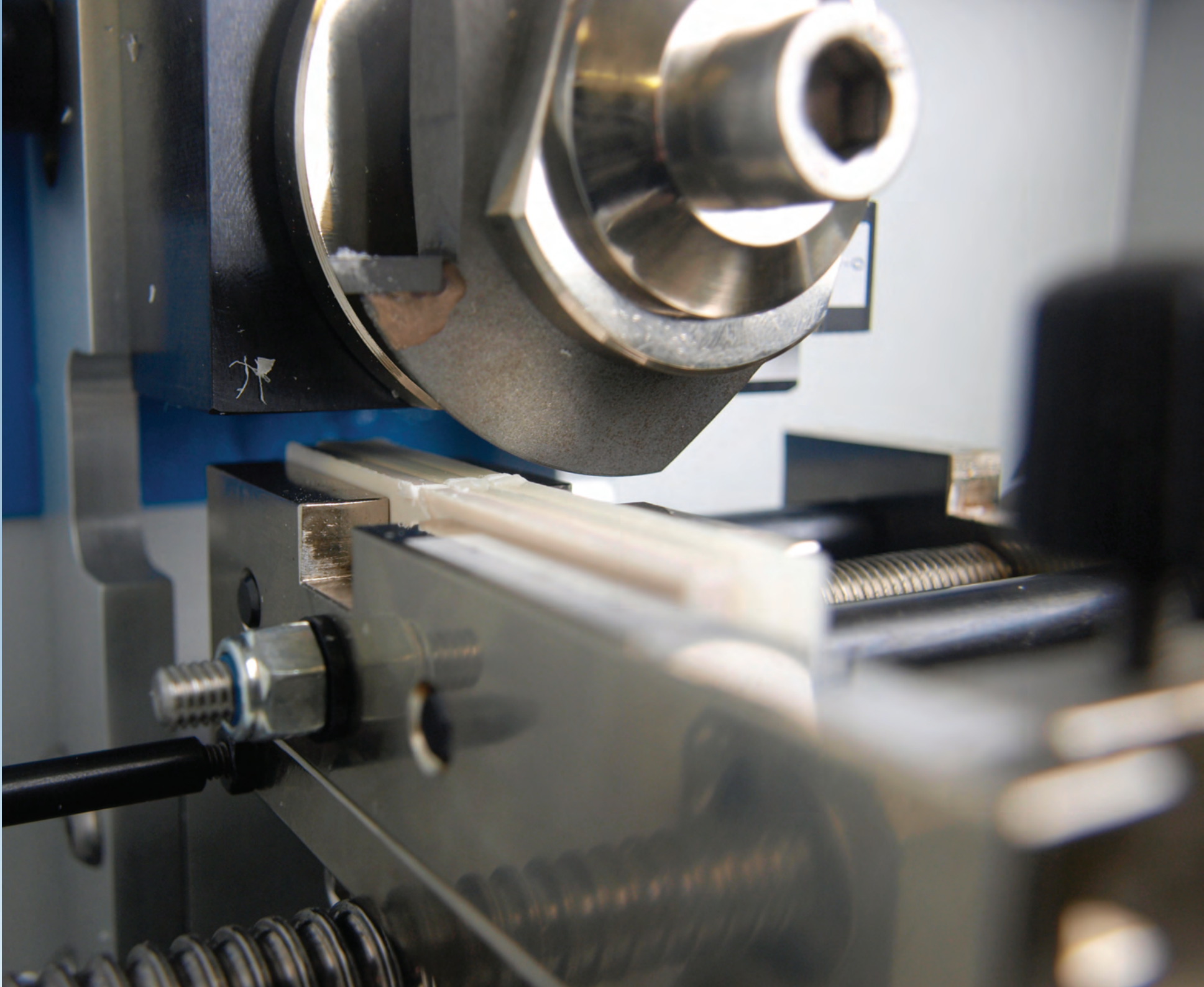
### TECHNICAL SPECIFICATION

- Manufactured from high carbon D3 tool steel
- Heat treated for durability
- Diamond lapped finished
- Spring loaded ejection system
- Any shape or size available
- Specimens to suit all national and international standards such as ISO, BS, ASTM, DIN, etc
- Suitable for rubbers, plastics, paper, fabrics and laminates
- Fixing shanks to suit customers own requirements



**RAY-RAN**

# AUTOCYCLE NOTCHING CUTTER





# AUTOCYCLE NOTCHING CUTTER

To produce precise stress concentrated notch profiles in Impact and Charpy specimens look no further than the **Ray-Ran Autocycle Notching Cutter**. A world leader by design, this machine will cut accurate notch profiles to international test standards such as ISO 179, ISO 180 and ASTM D256.

At the heart of the machine is a custom built adaptive Microprocessor Control Unit with LCD screen ensuring feed and cutter speeds are always selected for optimum performance. Adjustments to cutting parameters are made using the integrated membrane keypad and are stored in the memory feature of the microprocessor. Cutter speed ranges from 350 to 2500 rpm are easily controlled, and with minimum feed rates of 0.06mm/rev cutting parameters for even the toughest of materials are easily achieved.

The anti-vibration guide rail system optimises profile accuracy and the multi-sample loading feature of the vice can accommodate up to 16 test specimens 4mm thick, all accurately cut within approximately 20 seconds increasing productivity. The quick auto-return feature ensures the vice is always in the correct place for loading and unloading the test specimens and the micro height adjustment, notch depth comparator and sample setting gauge ensure that the cut notch depth is accurately controlled. A polycarbonate guard is fitted for operator safety totally enclosing the working area



and provides an electrical interlock so the machine does not operate when the guard is open.

The Dual Tooth Cutting Wheels used on the Autocycle Notching Cutter are designed to reduce cutter load on the sample being notched. They are tungsten carbide tipped, optically ground and diamond lapped to very close tolerances. The standard cutter wheel profile fitted to the apparatus is a 0.25mm radius V notch.

Cutter wheel profiles of 0.1mm and 1.0mm radius as well as 0.8mm and 2.00mm 'U' notch cutter wheels are also available. Non-standard and special notch requirements can also be provided for.

## NOTCHING CUTTER (RR/NC)

### TECHNICAL SPECIFICATION

- Advanced dedicated microprocessor control
- Easy to read LCD
- Touch membrane keypad
- Memory feature
- Cutter speed range from 350 rpm to 2500 rpm
- Traverse speed range 0.06 mm/rev to 1.0 mm/rev
- Metric and imperial traverse speeds units
- Anti-vibration linear motion slide
- Multi-sample loading
- Cutter wheel 0.25mm radius included
- Notch depth comparator,
- Notch depth gauge block
- Easy clean removable waste tray
- Polycarbonate safety guard
- Electrical Interlock
- Emergency stop button
- Product user manual
- CE declaration certificate
- 1 year return to base warranty
- Notches to International Test Standards, Including: ASTM D256, D6110, ISO 179, 180, 8256, DIN 53453

### OPTIONAL ANCILLARIES

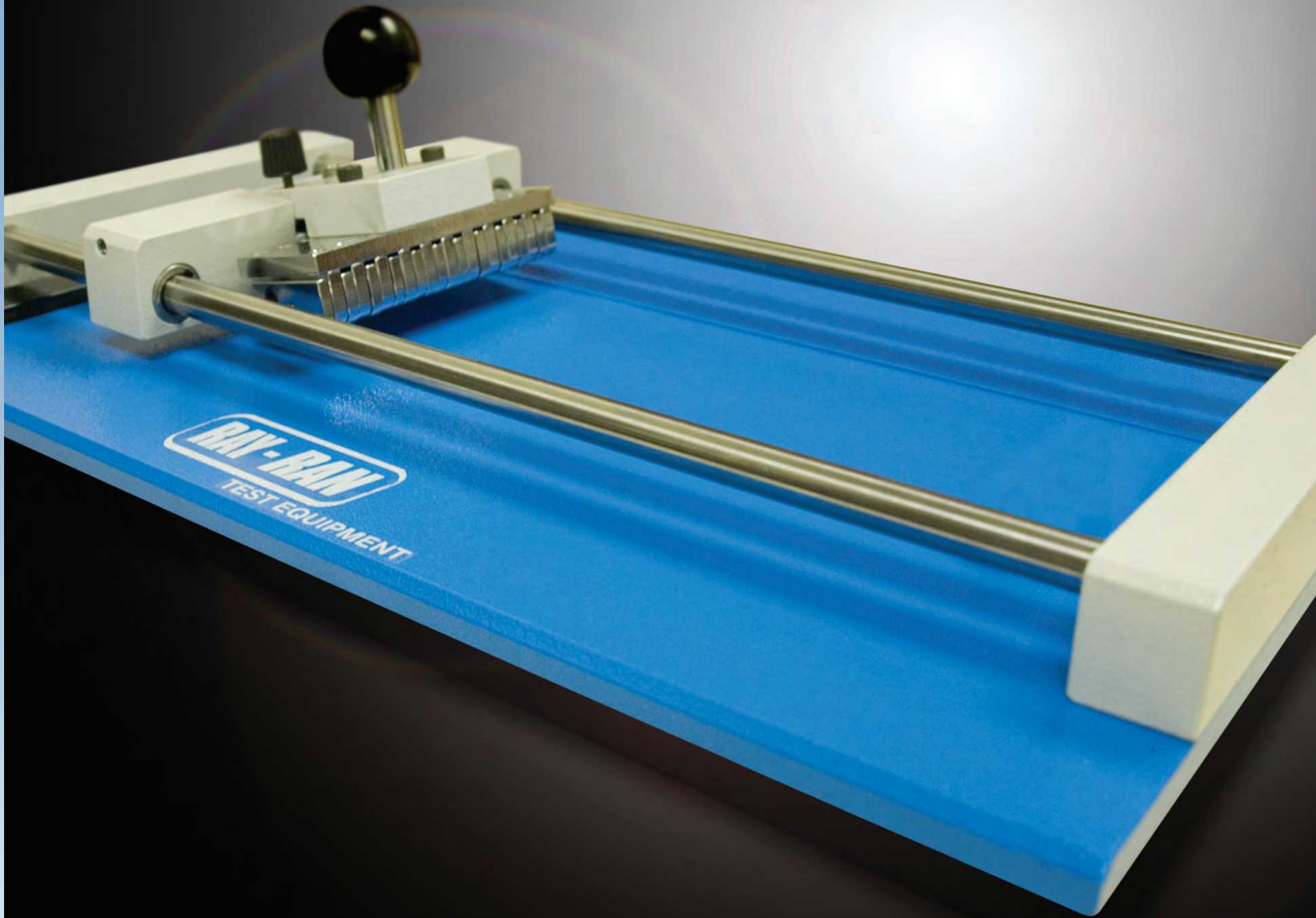
- Dual tooth cutter wheel 0.01mm Rad V notch
- Dual tooth cutter wheel 0.25mm Rad V notch
- Dual tooth cutter wheel 1.00mm Rad V notch
- Dual tooth cutter wheel 0.80mm U notch
- Dual tooth cutter wheel 2.00mm U notch

### WEIGHTS & DIMENSIONS: RR/NC

Net Weight (kg)	15
Width (cm)	54
Depth (cm)	33
Height (cm)	25

**RAY-RAN**

# MICRO CUTTING MACHINE

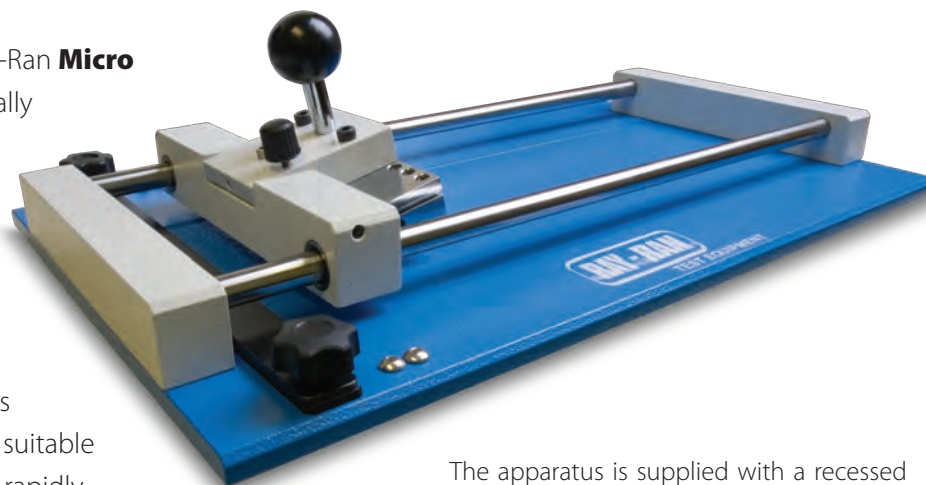




# MICRO CUTTING MACHINE FOR THIN MATERIALS

Built with absolute simplicity, the Ray-Ran **Micro Cutting Machine** has been specifically designed to cut thin plastic film and other materials into rectangular strips of varied widths using specifically designed cutting heads. It is ideal for making Tensile and Tear Test strips to various International Test Standards when conventional die cutting is not suitable or recommended. This apparatus has rapidly become a valuable tool from the Ray-Ran product range and is ideal for all types of flexible packaging, film, foils and paper up to 250µm (0.25mm) thick.

Extremely simple to operate, the adjustable spring loaded head support slides on hardened and ground steel rail guides using linear roller bearings to maintain rigidity and accuracy when cutting. The cutting head attachment is made from high quality tool steel and chrome plated for rust protection and holds 2 custom made razor sharp blades accurately spaced to within 0.01mm. The cutter head blades are easily removed when they are worn and need replacing and no further adjustment to the new blades will be required when fitted. With a minimum cut width of 0.25mm, cutting heads can be supplied to cut single or multiple test samples in one single pass increasing your testing capacity and productivity.



The apparatus is supplied with a recessed base which can accept a cutting base pad such as card or rubber sheet which will help protect the cutting blades during the cutting process. A clamping mechanism is also fitted to firmly support the sample material. As standard the cutting stroke length of the apparatus accommodates A4 size samples but this can be increased to customer's individual requirements.

To operate the Micro Cutting Machine, insert the material under the cutting rails and position it into the clamping mechanism. Slightly slide the cutting head to a position over the material approximately 10 – 20 mm from its clamped edge. Push the cutter down on top of the material and pull the cutter head towards you across the guide rails. Once at the end of its travel, return the cutter head to its start position. Simply release the clamping mechanism, remove the material and trim the sample to the required length.

## MICRO CUTTING MACHINE (RR/MCM)

### TECHNICAL SPECIFICATION

- Simple to operate film cutter
- Cuts film up to 250µm (0.25mm) thick
- Minimum sample width 250µm (0.25mm)
- Hardened and ground guide rail system
- Linear roller bearing guides
- Spring loaded cutter head assembly
- Interchangeable cutter heads
- Multi cut heads available
- Cutter heads made to customers requirements
- Sample clamping rail
- Cutting stroke length A4 as standard.
- Product user manual
- CE declaration certificate
- 1 year return to base warranty

### OPTIONAL ANCILLARIES

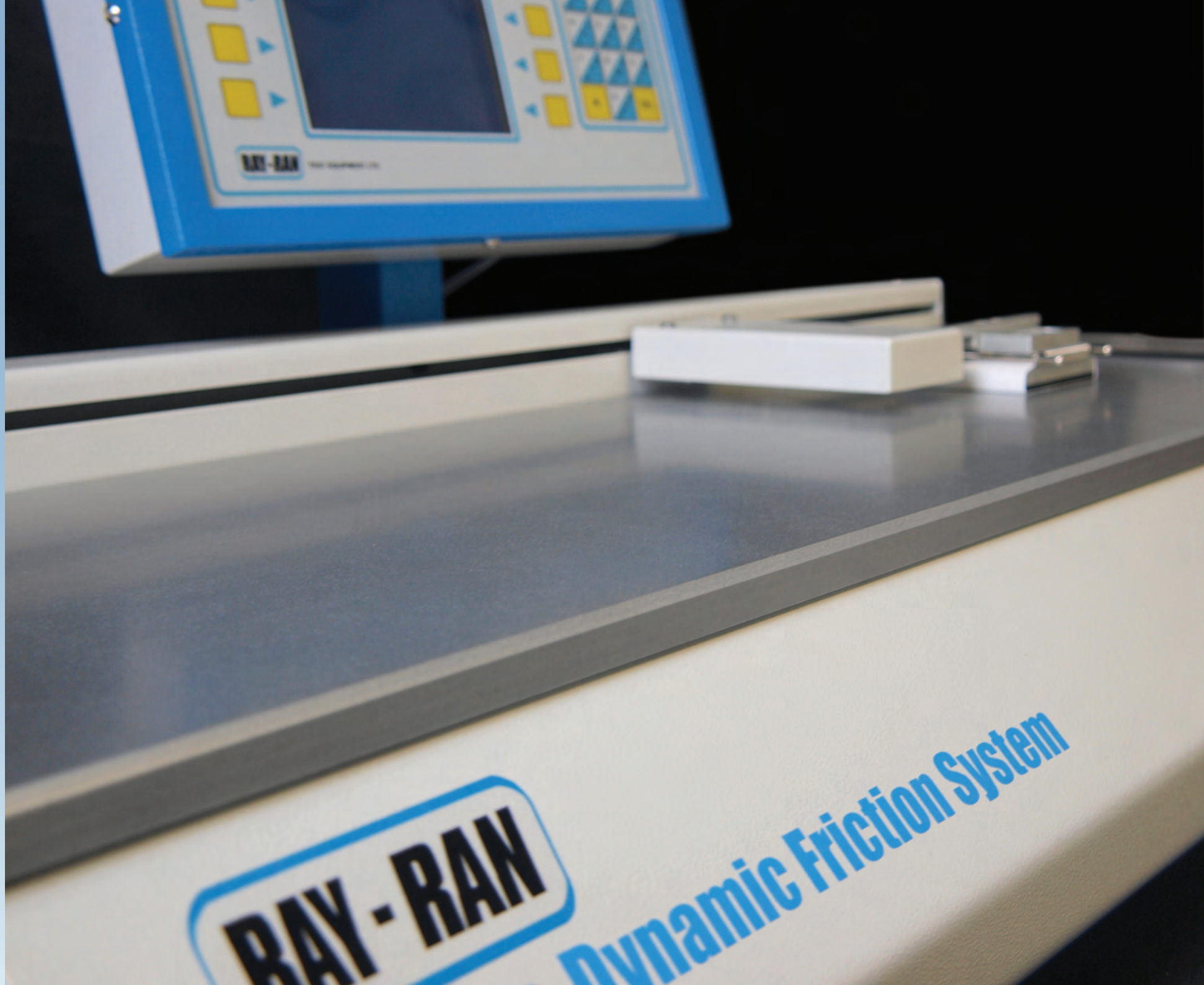
- Cutting stroke length to customers requirements
- Cutter heads made to customers requirements
- Multiple blades available on one cutter head
- Cutting Blades (Pack of 10)

### WEIGHTS & DIMENSIONS: RR/MCM

Net Weight (kg)	5
Width (cm)	40
Depth (cm)	20
Height (cm)	10

**RAY-RAN**

# ADVANCED STATIC AND DYNAMIC FRICTION TESTER





# ADVANCED STATIC AND DYNAMIC FRICTION TESTER

The **Advanced Static and Dynamic Friction Tester** brings together accurate load cell measurement with advanced microprocessor technology to give the most accurate, user friendly Friction Tester system to be designed by Ray-Ran. Frictional properties of plastic film and other materials are accurately calculated with specified test conditions selected such as test sled weight, test velocity and temperature making this apparatus ideal for all types of flexible packaging, foils, paper, board, rubber, linoleum, textiles and leather.

Accurate and repeatable test results for Static and Dynamic Friction co-efficient values, with normal separating loads of up to 1 kg, are easily determined for any combination of materials using a standard test sled or specific peel attachment.

To calculate the static friction, the apparatus records the peak friction value at the precise moment that movement occurs after which, the dynamic friction is immediately observed. To measure this peak friction value, the advanced microprocessor continually monitors the output signals of the load cell. Load cell readings are taken beyond the peak load in order to confirm that the slope of the load curve is reducing. When the static frictional value has been determined by the microprocessor the dynamic friction is measured twenty times during the selected travel distance. The result given is the average of these twenty readings. However, by displaying the results graphically on a computer, each of the twenty

readings can be inspected to examine any variation in the test results over the selected travel distance.

The large on board liquid crystal display (LCD) provides simple on screen instruction and using the alpha/numeric membrane keypad test parameters such as user names, material reference numbers and batch numbers are entered and stored in operator lists for future recall and results presentation. Testing parameters such as test velocity, sled weight and settling time are also entered to give the required testing conditions. If Temperature is important to your testing requirement then the Static and Dynamic Friction Tester can be supplied with an optional heated bed. After each test has been conducted the results are displayed on the LCD giving the static and dynamic co-efficient as well as the test load result in grams. Batch statistics are automatically updated after each test and results are shown in graphical and tabular format for analysis when downloaded to



the supplied PC software. For quality control purposes the Static & Dynamic Friction Tester can be set with High and Low limits which are clearly defined when test results are downloaded showing the user instantly if the material is a pass or fail.

The apparatus is supplied as standard with Ray-Ran's **Techni-Test** Windows based PC software for connection to the apparatus via an RS232 or Ethernet connection. Test results can be printed directly from the **Techni-Test software** or can be saved and exported as .CSV files which can be opened with Microsoft Excel in tabular form which can be manipulated to your specific requirements such as preparing a graphical presentation or copying the results to a Word document for a report presentation if required. If the apparatus is connected to the PC via the Ethernet connector over a LAN network then the RS232 can be used for connection to an optional thermal printer for direct printout by the operator.

## TECHNICAL SPECIFICATION

- Advanced dedicated microprocessor control,
- Touch membrane keypad
- Easy to read liquid crystal display,
- Sequence logic menu auto prompt selection
- RS232 interface connector
- Ethernet Interface connector for LAN Networking
- Tabular and graphical statistical analysis
- Temperature display
- Variable speed sled velocity up to 1800 mm/minute,
- Test travel distance up to 350mm
- 1 kg load cell
- Sleds to ASTM or ISO test standard supplied
- 180 peel attachment
- Sample cut out template
- Calibration kit included
- Available in either 220-240v 50hz or 110v 60hz
- Fully traceable certificate of calibration,
- Product user manual,
- CE mark of conformity.
- 1 year return to base warranty

## TESTING FEATURES

- Operator list
- Material reference list
- Batch ref with data input
- Selectable test type
- Variable sled weight option
- Variable sled velocity option
- Variable test travel distance
- Variable sample settling time
- User defined High and low limits
- Load cell pre-load indicator
- Temperature selector (heated bed option)
- Conforms to: ISO8295, ASTM D1894

## OPTIONAL ANCILLARIES

- Heated bed option
- Freezer bed option
- Larger load cells
- Sleds to customer's requirements
- Thermal Printer

### WEIGHTS & DIMENSIONS: RR/FT

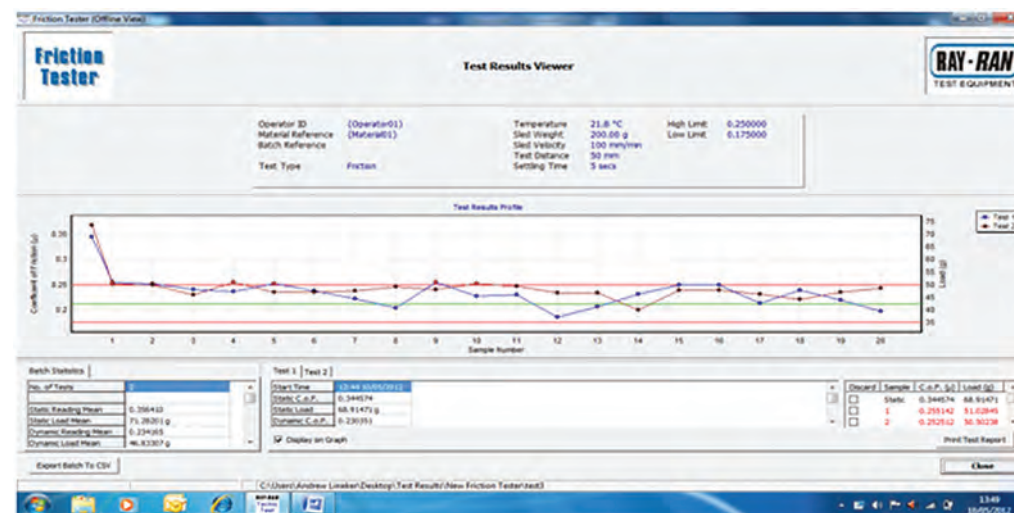
Net Weight (kg)	24
Width (cm)	67
Depth (cm)	40
Height (cm)	37

# FRICTION ANALYSIS WITH TECHNI-TEST

**Techni-Test** is an easy to use software package supplied with the **Advanced Static & Dynamic Friction Tester** which allows user defined test data to automatically download to the apparatus for report information and for the operator to analyse all aspects of the friction test.

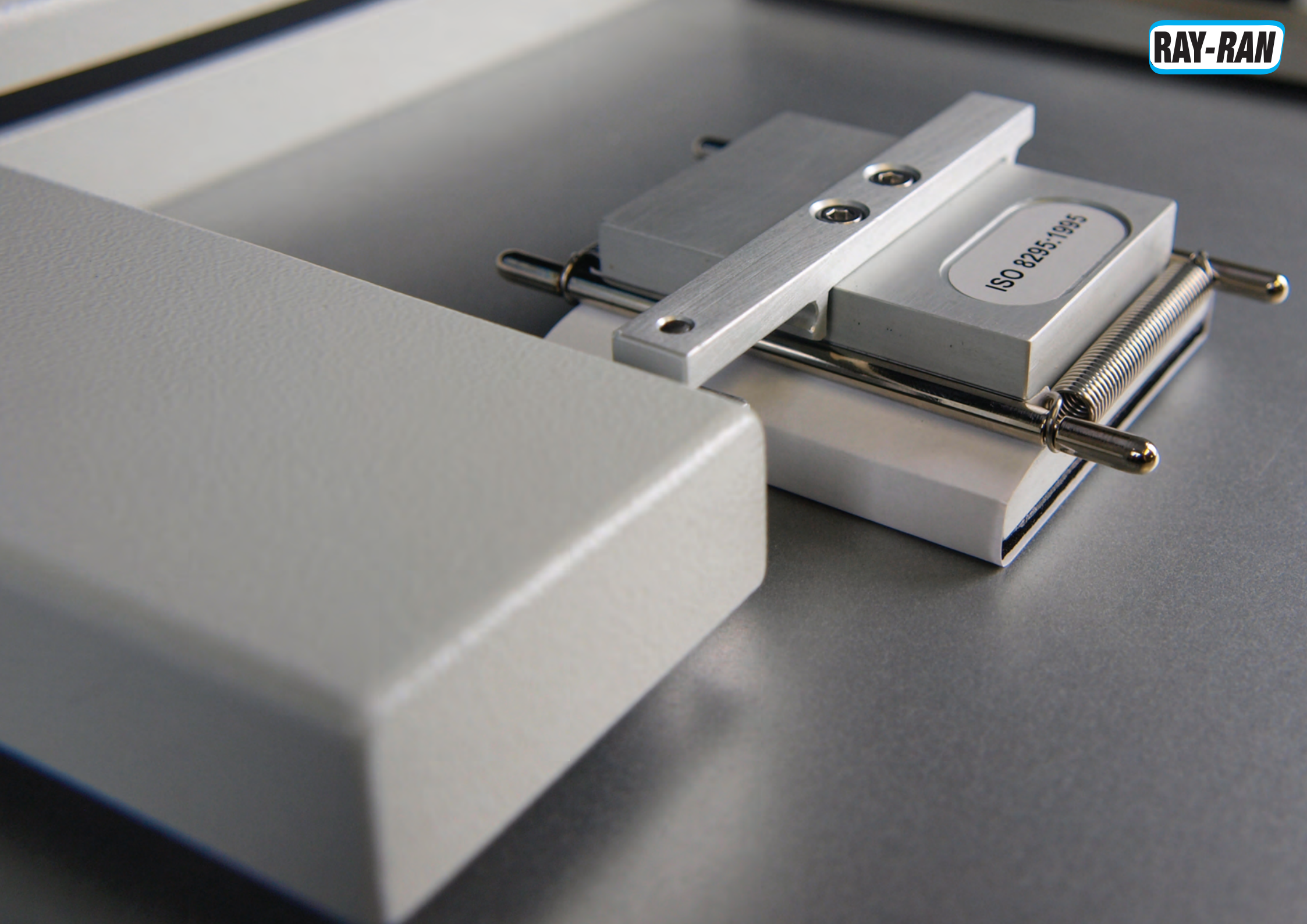
From the graph, each load cell reading is clearly identified giving accurate frictional data analysis of the materials under test. Multiple tests are clearly visible on the graph for results comparison within the batch and are highlighted in different colours for viewing. Placing the cursor over each plotted point the frictional value can be read on the screen. For internal

Quality Control procedures, at a glance high and low limits are clearly displayed on the graph in red on showing instantly if the material is a pass or fail. Tabular results are shown as Test1, Test 2, etc and can be seen by selecting the appropriate tab for a test. Test reports can be printed from the main screen when each test has been completed by highlighting the specific test tab and selecting the **Print Test Report** dialogue box to print the report. Batch statistics such as **Mean** and **Co-efficient of Variation** (COV) are also displayed and are updated after each test result is downloaded.



In Test Results Viewer mode users have the ability to upload saved results from previous test for Material Comparison, Data Manipulation or File Export. Abnormal results that could be caused by static or dust are clearly identified and can be removed from the test data bringing the batch statistics into a normal range ensuring that the test procedure does not have to be repeated saving time and material. Exporting the results file in Viewer Mode is simple. The Export file format is .CSV and can be opened with Microsoft Excel.







**RAY-RAN**

# FALLING DART IMPACT TESTER





# MANUAL FALLING DART IMPACT TESTER

The Ray-Ran **Manually Operated Falling Dart Impact Tester** provides a basic method for determining the energy that causes thin flexible materials such as plastic film, paper and composite sheets to fail under specified conditions of impact from a free falling dart. The energy required to tear or puncture the test specimen is expressed in terms of the darts weight which would result in the failure of 50% of specimens being tested. The instrument complies with the ASTM D1709 Method A & B and ISO 7765.

The methods of holding the test specimen and releasing the dart are designed so that they may be accurately repeated for each test performed. Test specimens are simply clamped in the unique two piece pneumatic clamp system which gives a constant tension across the surface area of the specimen ensuring test repeatability. A dart of a known weight is then allowed to free fall and hit the sample. To comply with the relevant test standards dart drop heights of either 660mm or 1500mm are easily obtained using the built in telescopic height adjustment assembly. The dart release mechanism is solenoid actuated and requires the use of both hands to release the dart to ensure optimum operator safety. A fully electrical interlocked guard is also



supplied to ensure the operators safety from falling and rebounding darts.

If the test specimen is broken during a test the dart will fall into the return shoot for easy dart retrieval. The walls of the shoot are perforated to exhaust air pressure which might arise inside the shoot when the test-piece deforms. Rubber buffers at the bottom of the shoot prevent the dart from getting damaged when it has passed through a sample.

The apparatus comes supplied with 2 off digital counters **break** and **non break** which are located on the front control panel to keep track on the type of impact failure of the sample and the total number of tests conducted. Also supplied as standard are 38.1mm and 50.8mm spherical radius darts and a set of binary weights.

## TECHNICAL SPECIFICATION

- Manually Operated Falling Dart Impact Tester
- Complies to ASTM D1709 methods A & B, ISO7765
- Easy to operate
- Variable drop height adjustment as standard 660mm – 1500mm
- Pneumatic clamping system
- Constant sample tension for repeatability
- Solenoid actuated dart release mechanism with audible pre-warning
- Dart return shoot
- 38.1mm (1 ½”) and 50.8mm (2”) spherical darts as standard
- Binary weight set supplied as standard
- Electrical interlock safety guard
- Product User Manual
- CE declaration certificate
- Traceable Calibration Certificate
- 1 year return to base warranty

## WEIGHTS & DIMENSIONS: RR/FDT-M

Net Weight (kg)	110
Width (cm)	50
Depth (cm)	63
Height (cm)	76

**RAY-RAN**

Power ON/OFF



Clamp





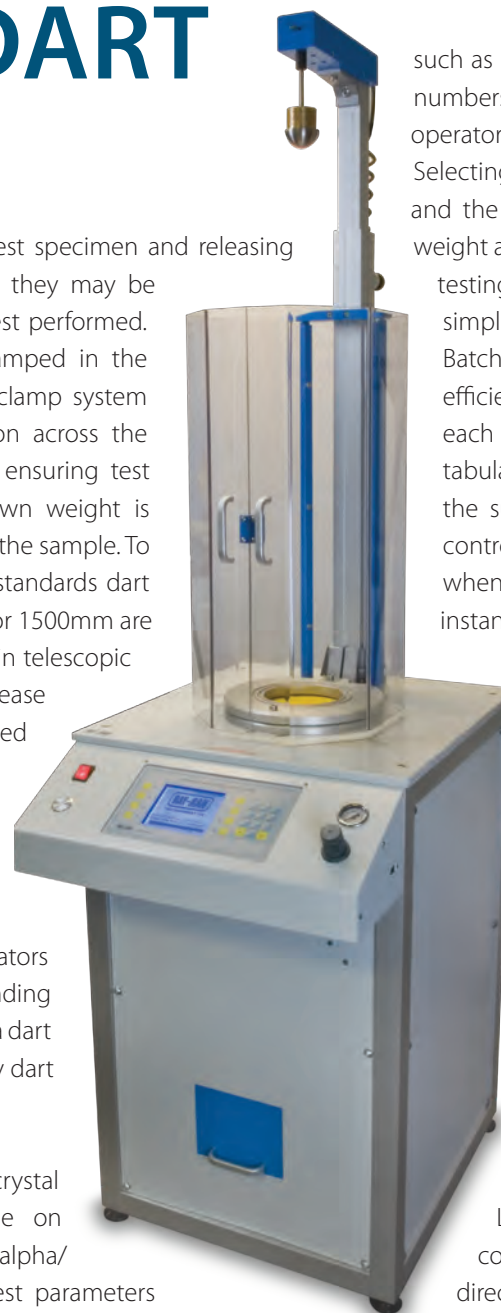
# ADVANCED FALLING DART IMPACT TESTER

Utilizing on-board microprocessor technology the Ray-Ran **Microprocessor Controlled Falling Dart Impact Tester** has taken falling dart testing machines to an advanced level at an affordable price. Built with operator simplicity in mind, its ease of operation and high accuracy makes it ideal for product development and quality control within production, research and development labs and teaching institutions.

The break energy that causes thin flexible materials such as plastic film, paper and composite sheets to fail under specified conditions of impact from a free falling dart has never been easier to establish. Complying with the ASTM D1709 Method A & B the apparatus uses photo electric cells to measure the energy (joules) to break or cause failure to the sample being tested. Usually manual testing requires at least sixty drops for each sample to gain a good result. For the Ray-Ran Microprocessor Controlled Apparatus this is greatly reduced. For perfect energy readings on new samples, a quantity of film will be required to firstly establish the working range of the drop weight required as the tup must **completely fall through the sample** to give an energy reading during a test. This test is very simple to conduct using the **Break Mass** test. Once the weight to pass through the sample has been established a working range of 50% of the tup weight should be good enough to produce repeatable results. If the break mass is already known then the **Break Energy** test will give you your energy reading in Joules

The methods of holding the test specimen and releasing the dart are designed so that they may be accurately repeated for each test performed. Test specimens are simply clamped in the unique two piece pneumatic clamp system which gives a constant tension across the surface area of the specimen ensuring test repeatability. A dart of a known weight is then allowed to free fall and hit the sample. To comply with the relevant test standards dart drop heights of either 660mm or 1500mm are easily obtained using the built in telescopic assembly. The dart release mechanism is solenoid actuated for easy release and requires the use of both hands to release the dart to ensure optimum operator safety. A fully electrical interlocked guard is also supplied to ensure the operators safety from falling and rebounding darts and for ruptured samples a dart return shoot is supplied for easy dart retrieval after the test.

The large on board liquid crystal display (LCD) provides simple on screen instruction and using the alpha/numeric membrane keypad test parameters



such as user names, material reference numbers, batch numbers and tup types are entered and stored in operator lists for future recall and results presentation. Selecting the type of test is done at the press of a button and the testing parameters such as drop height, tup weight and sample size are entered to give the required testing conditions. At start of each batch of tests a simple calibration of the apparatus is conducted. Batch statistics of mean, standard deviation and coefficient of variation are automatically updated after each test and results are shown in graphical and tabular format for analysis when downloaded to the supplied **Techni-Test** PC software. For quality control purposes High and Low limits can be defined when test results are downloaded showing the user instantly if the material is a pass or fail.

The apparatus is supplied as standard with Ray-Ran's **Techni-Test** Windows based PC software for connection to the apparatus via an RS232 or ethernet connection. Test results can be printed directly from the **Techni-Test** software or can be saved and exported as .CSV files which can be opened with Microsoft Excel in tabular form which can be manipulated to your specific requirements such as preparing a graphical presentation or copying the results to a Word document for a report presentation if required. If the apparatus is connected to the PC via the ethernet connector over a LAN network then the RS232 can be used for connection to an optional thermal printer for direct printout by the operator.

## TECHNICAL SPECIFICATION

- Advanced dedicated microprocessor control,
- Touch membrane Alpha / Numeric keypad
- Easy to read liquid crystal display,
- Sequence logic menu auto prompt selection
- RS232 interface connector
- Ethernet Interface connector for LAN Networking
- Self-calibration procedure.
- Photo electric cell technology
- Variable drop height adjustment as standard 660mm – 1500mm
- Pneumatic clamping system
- Constant sample tension for repeatability
- Solenoid actuated dart release mechanism with audible pre-warning
- Dart return shoot
- 38.1mm (1 1/2") and 50.8mm (2") spherical darts as standard
- Binary weight set supplied as standard
- Electrical interlock safety guard
- Tabular and graphical statistical analysis
- **Techni-Test** PC software
- Product User Manual
- CE declaration certificate
- Traceable Calibration Certificate
- 1 year return to base warranty

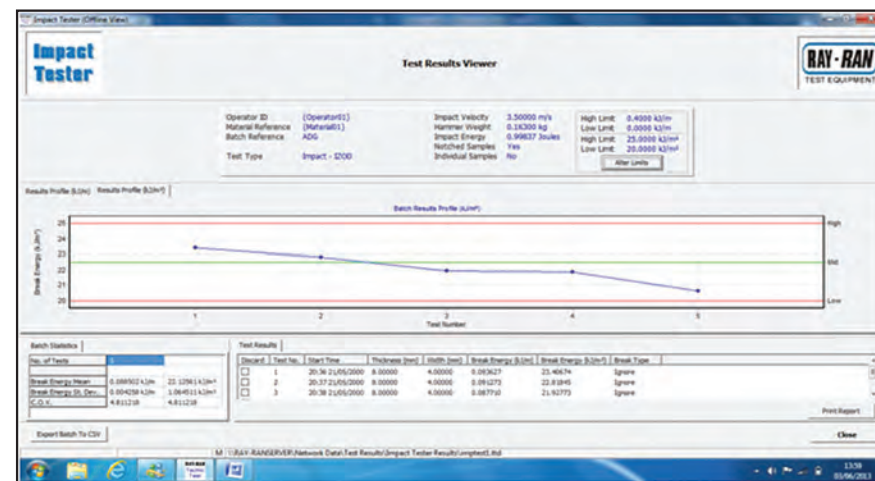
### WEIGHTS & DIMENSIONS: RR/FDT-A

Net Weight (kg)	110
Width (cm)	50
Depth (cm)	63
Height (cm)	76

# TECHNI-TEST MAKES A STRONG IMPACT

**Techni-Test** is the easy to use software package supplied as standard with the **Advanced Falling Dart Impact Tester** which allows user defined test data and test results to automatically download from the apparatus for results presentation and data reporting.

Test data downloaded to **Techni-Test** includes operator, material reference, batch reference, test type, impact velocity, hammer weight and impact energy.

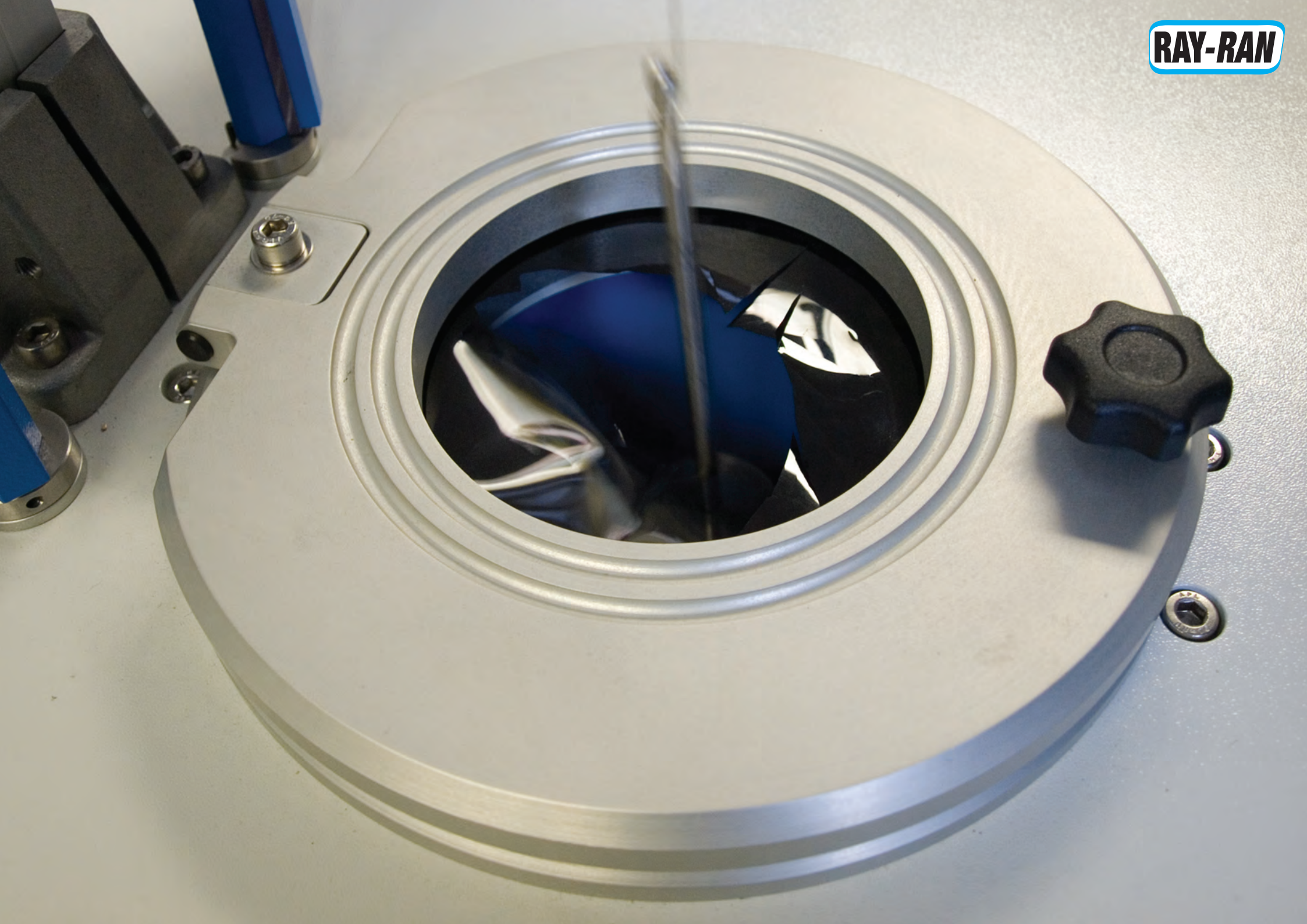


From the results graph each impact test value is clearly identified giving accurate data analysis of the material under test. The graphical impact results can be displayed in KJ/M or KJ/M<sup>2</sup> by simply selecting the appropriate results profile tab at the top of the graph. By placing the cursor over each plotted point the impact value can also be read on the screen. For internal Quality Control procedures at a glance high and low limits are clearly displayed on the graph in red showing instantly if the material is a pass or fail. High and low limits are set on the main screen within the **Techni-Test** software so they can be altered easily without having to re-enter test data and re-test material samples. Tabular results are also displayed under the test results tab for quick results processing and comparison analysis between test samples. **Batch** statistics such as **Mean** and **Co-efficient of Variation (COV)** are also displayed and are updated after each test result is downloaded.

Test results can be printed directly from the **Techni-Test** software in a report format or can be saved and exported as .CSV files which can be opened with Microsoft Excel in tabular form which can be manipulated to your specific requirements such as preparing a graphical presentation or copying the results to a Word document for a report presentation if required

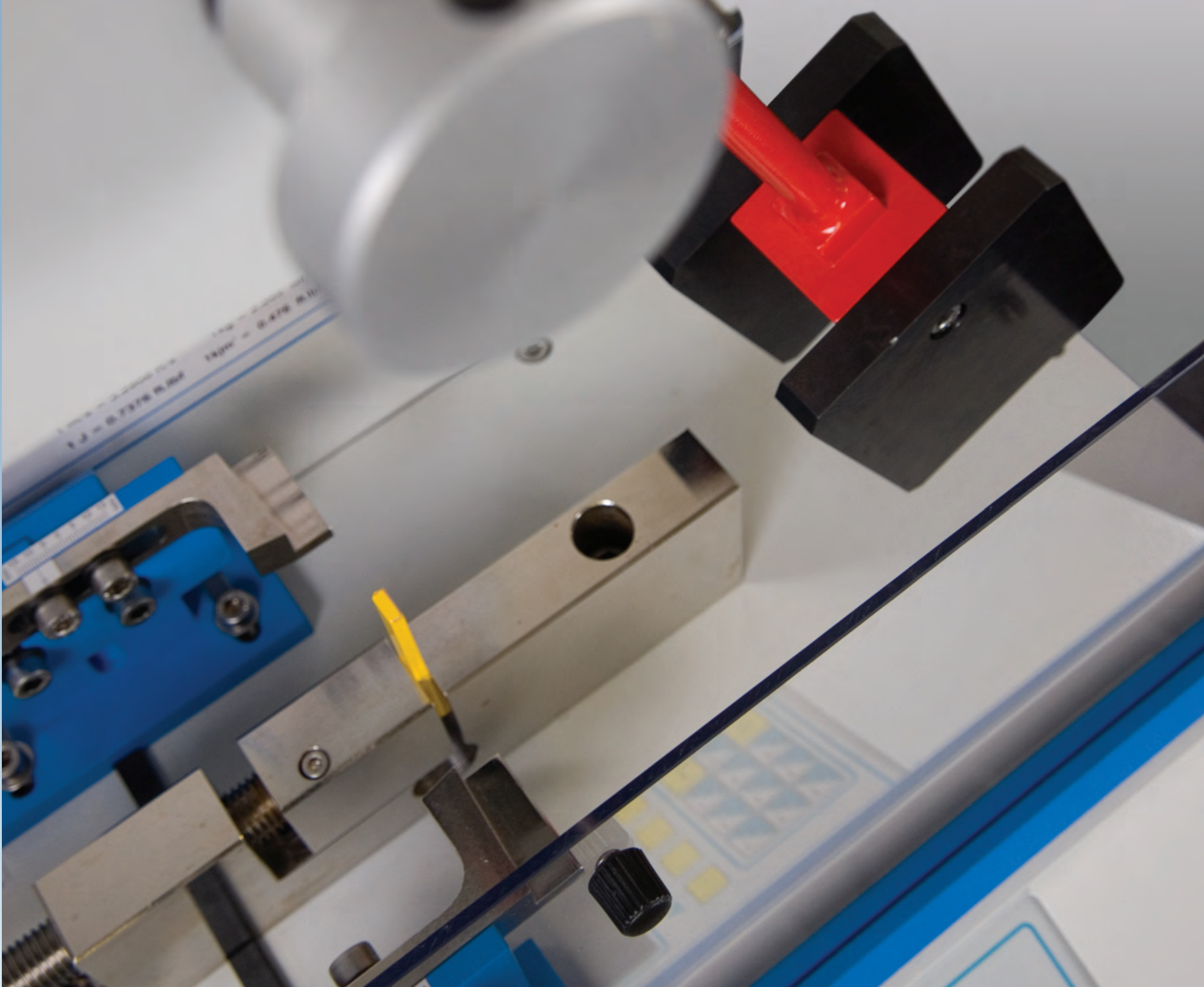
In Test Results Viewer mode, users have the ability to upload saved results from previous test for Material Comparison, Data Manipulation or File Export. Abnormal results that could be caused by air voids are clearly identified and can be removed from the test data bringing the batch statistics into a normal range ensuring that the test procedure does not have to be repeated saving time and material. Test results displayed in viewer mode can also be exported as .CSV files easily.







# PENDULUM IMPACT TESTER





# ADVANCED UNIVERSAL PENDULUM IMPACT TESTER

The Ray-Ran **Advanced Universal Pendulum Impact Tester** utilises advanced microprocessor technology to determine the energy required to break or rupture specimens such as plastics, composites, ceramics and non ferrous metals to International testing methods for Izod, Charpy and Tension Impact Testing. Along with Pipe Testing, Component Testing and Puncture Impact testing the Ray-Ran Universal Pendulum Impact Tester should more than meet all of your testing requirements.

Built with operator simplicity in mind, its ease of operation and high accuracy makes it ideal for product development and quality control within production, research and development labs and teaching institutions. The apparatus is extremely versatile. Impact velocities are variable from 1.5 m/s up to 3.8 m/s and combined with highly accurate variable weight hammers which are electronically released by a solenoid, impact energy ranges up to 50 Joules can be reached.

To calculate the impact energy, the apparatus uses advanced and highly accurate rotary encoder technology to record the lost angle of the hammer after impacting a test sample against the angle recorded after calibrating the hammer. The resulting lost angle is calculated as the test sample's impact energy by the advanced microprocessor system.

The large on board liquid crystal display (LCD) provides

simple on screen instruction and using the alpha/numeric membrane keypad test parameters such as user names, material reference numbers and batch numbers are entered and stored in operator lists for future recall and results presentation.

Selecting the type of test is done at the press of a button and the testing parameters such as impact hammer weight, impact velocity and sample size are entered to give the required testing conditions. At start of each batch of tests, a simple calibration of the apparatus is conducted for bearing resistance and windage and after each test sample has been tested, the results are displayed on the LCD giving the Impact energy in KJ/M and KJ/M<sup>2</sup>. Batch statistics of mean, standard deviation and co-efficient of variation are automatically updated after each test and results are shown in graphical and tabular format for analysis when downloaded to the supplied **Techni-Test** PC software. For quality control purposes High and Low limits can be defined when test results are downloaded showing the user instantly if the material is a pass or fail.



## TECHNICAL SPECIFICATION

- Advanced dedicated microprocessor control,
- Touch membrane Alpha / Numeric keypad
- Easy to read liquid crystal display,
- Sequence logic menu auto prompt selection
- RS232 interface connector
- Ethernet Interface connector for LAN Networking
- Self-calibration procedure for wind and bearing resistance.
- High resolution positional encoder
- Variable pendulum velocity up to 3.8 m/s
- Hammer energies up to 50 Joules
- Results in KJ/M and KJ/M<sup>2</sup>
- Izod, Charpy, Tension, Component, Pipe and Puncture testing.
- Electronic levelling device
- Safety guard
- Solenoid pendulum release with audible pre-warning
- Tabular and graphical statistical analysis
- **Techni-Test** PC software
- Product User Manual
- CE declaration certificate
- Traceable Calibration Certificate
- 1 year return to base warranty

## OPTIONAL ANCILLARIES

- Izod Vice
- Charpy Rest
- Tension Impact Rest (Specimen in bed method)
- Puncture Impact Fixture
- Pipe Rest
- Component fixture to customer requirements
- Variable weight impact hammers up to 50 Joules
- Thermal printer
- Full safety enclosure
- Low temperature chamber

### WEIGHTS & DIMENSIONS: RR/IMT

Net Weight (kg)	110
Width (cm)	63
Depth (cm)	50
Height (cm)	76

# ADVANCED UNIVERSAL PENDULUM IMPACT TESTER

## TESTING METHODS AVAILABLE:

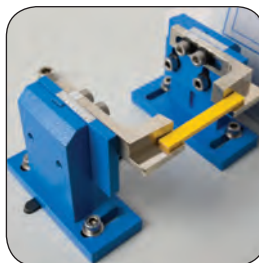
### IZOD TEST

For the Izod test, the specimen is supported and impacted in a cantilevered position with one end of the specimen clamped into the vice. A single swing of the impact hammer is required to break the specimen and the subsequent impact strength calculated. Notched or Un-notched specimens can be tested using the Izod method. Complies to International Test Standards ASTM D256, ASTM D4812 and ISO 180. Impact hammer energies are available from 0.5 J up to 25 J



### CHARPY TEST

The Charpy test requires a standard notched or un-notched test specimen to be supported as a horizontal beam and is impacted on either its narrow face or the width of its cross-section. A single swing of the impact hammer is required to break the specimen and the subsequent impact strength calculated. Complies to International Test Standards ISO 179, ASTM D256, ASTM D6110, DIN 53453, DIN 53753, and BS 7413. Impact hammer energies are available from 0.5 J up to 50 J



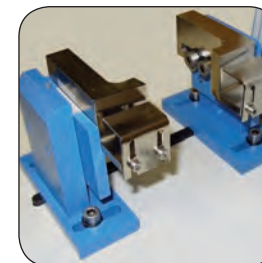
### TENSION IMPACT

Tensile impact tests are conducted on material samples that are either too thin or exhibit a high elongation before fracture. The test sample, usually in the shape of a tensile bar, is positioned in a horizontal plane with one end supported to the base of the apparatus and the other end supported by a movable clamp. When the pendulum is released it strikes the movable clamp and breaks the test piece along its horizontal axis, thus applying a pure tensile load to the test sample. Complies to International Test Standard ISO 8256 Method A. Impact hammer energies are available from 0.5 J up to 50 J.



### PIPE TESTING

The test is used for the examination of pipe sections and tubing for impact strength properties as either complete segments or small sections of pipes. Sample diameter dimensions up to 25 mm can be tested with hammer energies of 7.5 - 15 J. The test specimen is supported as a horizontal





## SAMPLE & COMPONENT TESTING

beam similar to Charpy tests conditions and complies to International Test Standards ISO 7628 and ISO 9854. Sample diameter dimensions up to 25 mm (0.98 in) can be tested with hammer energies of 7.5 - 15 J (5.6 - 11.1 ft-lbs) or 50 J (36.9 ft-lbs), as defined in the ISO standards.

## COMPONENT TEST

The component test examines the influences of both the design and the manufacturing processes of a particular component by measuring the impact energy in Joules, required to break a complete or part of a section of a finished component.

If a particular component has a critical cross sectional area that needs to be tested then by entering this area into the microprocessor the energy in  $\text{KJ/M}^2$  can be obtained.

The apparatus is supplied as standard with Ray-Ran's **Techni-Test** Windows based PC software for connection to the apparatus via an RS232 or Ethernet connection. Test results can be printed directly from the **Techni-Test** software or can be saved and exported as .CSV files which can be opened with Microsoft Excel in tabular form which can be manipulated to your specific requirements such as preparing a graphical presentation or copying the results to a Word document for a report presentation if required. For quality control purposes, High and Low limits can be defined when test results are downloaded showing the user instantly if the material is a pass or fail. If the apparatus is connected to the PC via the Ethernet connector over a LAN network then the RS232 can be used for connection to an optional thermal printer for direct printout by the operator.



## ADVANCED UNIVERSAL PENDULUM IMPACT TESTER: TECHNI-TEST SOFTWARE

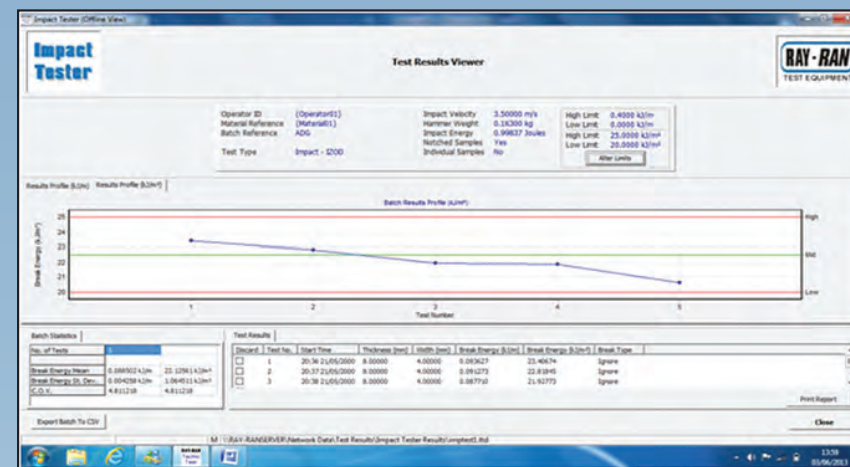
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## TECHNI-TEST MAKES A STRONG IMPACT

**Techni-Test** is the easy to use software package supplied as standard with the **Advanced Universal Pendulum Impact Tester**, which allows user defined test data and test results to automatically download from the apparatus for results presentation and data reporting.

Test data downloaded to **Techni-Test** includes operator, material reference, batch reference, test type, impact velocity, hammer weight and impact energy.

From the results graph each impact test value is clearly identified giving accurate data analysis of the material under test. The graphical impact results can be displayed in  $\text{KJ/M}$  or  $\text{KJ/M}^2$  by simply selecting the appropriate results profile tab at the top of the graph. By placing the cursor over each plotted point the impact value can also be read on the screen. For internal Quality Control procedures at a glance high and low limits are clearly displayed on the graph in red showing instantly if the material is a pass or fail. High and low limits are set on the main screen within the **Techni-Test** software so they can be altered easily without having to re-enter test data and re-test material samples. Tabular results are also displayed under the test results tab for quick results processing and comparison analysis between test samples. **Batch** statistics such as **Mean** and **Co-efficient of Variation**



(COV) are also displayed and are updated after each test result is downloaded.

Test results can be printed directly from the **Techni-Test** software in a report format or can be saved and exported as .CSV files which can be opened with Microsoft Excel in tabular form which can be manipulated to your specific requirements such as preparing a graphical presentation or copying the results to a Word document for a report presentation if required.

In Test Results Viewer mode users have the ability to upload saved results from previous test for Material Comparison, Data Manipulation or File Export. Abnormal results that could be caused by air voids are clearly identified and can be removed from the test data bringing the batch statistics into a normal range ensuring that the test procedure does not have to be repeated saving time and material. Test results displayed in viewer mode can also be exported as .CSV files easily.

Results screen

## TECHNICAL SPECIFICATION

- Advanced dedicated microprocessor control,
- Touch membrane Alpha / Numeric keypad
- Easy to read liquid crystal display,
- Sequence logic menu auto prompt selection
- RS232 interface connector
- Ethernet Interface connector for LAN Networking
- Self-calibration procedure for wind and bearing resistance.
- High resolution positional encoder
- Variable pendulum velocity up to 3.8 m/s
- Hammer energies up to 50 Joules
- Results in KJ/M and KJ/M<sup>2</sup>
- Izod, Charpy, Tension, Component, Pipe and Puncture testing.
- Electronic levelling device
- Safety guard
- Solenoid pendulum release with audible pre-warning
- Tabular and graphical statistical analysis
- **Techni-Test** PC software
- Product User Manual
- CE declaration certificate
- Traceable Calibration Certificate
- 1 year return to base warranty

## OPTIONAL ANCILLARIES

- Izod Vice
- Charpy Rest
- Tension Impact Rest (Specimen in bed method)
- Puncture Impact Fixture
- Pipe Rest
- Component fixture to customer requirements
- Variable weight impact hammers up to 50 Joules
- Thermal printer
- Full safety enclosure
- Low Temperature Chamber

## WEIGHTS & DIMENSIONS: RR/IMT

Net Weight (kg)	110
Width (cm)	63
Depth (cm)	50
Height (cm)	76

# ADVANCED UNIVERSAL PENDULUM IMPACT TESTER WITH PUNCTURE IMPACT

Determining the most cost effective packaging material specification for a particular application can be a daunting proposition. The impact strength can be crucial if the handling of the package cannot be controlled, especially if objects with sharp profiles are to be packaged and reliable information is not available on the material behaviour under different load conditions. The Ray-Ran **Advanced Universal Pendulum Impact Tester** has been designed to overcome these problems using the optional **Puncture Impact** fixture which makes it ideal for research and development within the packaging industry.

The Puncture Impact Tester can examine the material behaviour of thin brittle or ductile materials in a combination of different ways. By using different Tup Strikers, the mode of failure can be analysed to represent direct comparisons with other materials and produce in-house quality control standards, or to simulate actual service conditions. For instance, if impact elongation properties are required for ductile materials, then a large spherical radius Tup Striker is used to induce a high degree of lateral elongation of the material before the Tup Striker can penetrate through the material to the point of failure. If however, a more brittle failure (minimum elongation of the material) is required, a more pointed Tup Striker is attached to the hammer to impact on the sample. If required, the Tup Striker can simulate the actual



object to be packaged to see how the packaging material would stand up to poor handling in service.

It is possible that the direction of material flow of the specimen

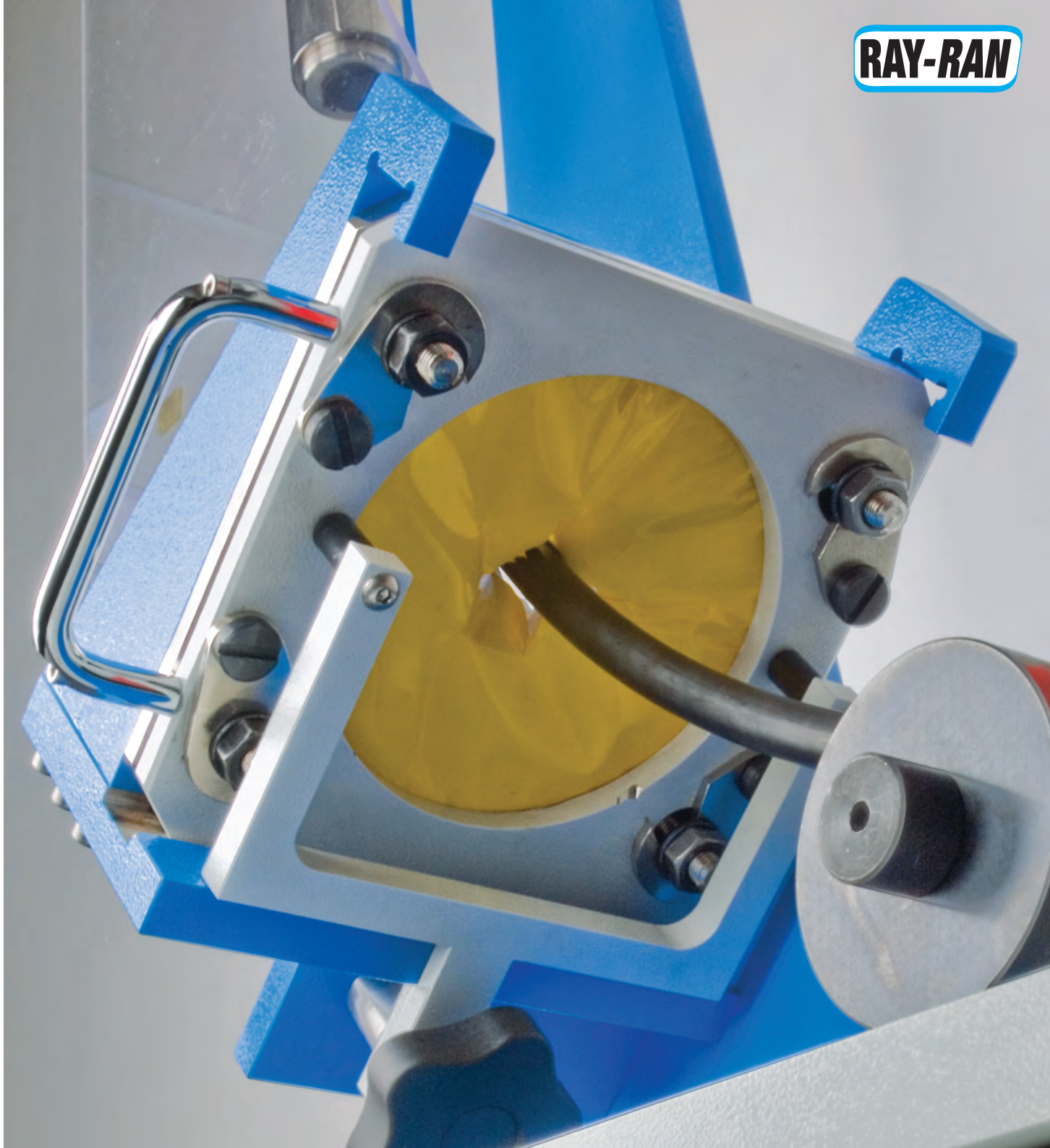


## SAMPLE & COMPONENT TESTING

could influence the test result therefore the test sample takes the form of a circular specimen, up to 500 microns thick which is clamped in a sample holder. To ensure repeatability, a rubber "O" ring is used to exert the same tension across the test sample and to prevent the sample moving when under test. The unique design of the variable weight pendulum hammer enables sheet material samples to be tested and punctured for ductile and brittle failure analysis. An impact hammer energy range of up to up to 25 Joules and testing velocities up to 3.8 m/s can be achieved ensuring the toughest of materials can be tested. To calculate the impact energy, the apparatus records the lost angle of the hammer after impacting a test sample against the angle recorded after calibrating the hammer. The resulting lost angle is calculated as the test sample's impact energy by the advanced microprocessor system.

The large on board liquid crystal display (LCD) provides simple on screen instruction and using the alpha/numeric membrane keypad test parameters such as user names, material reference numbers and batch numbers are entered and stored in operator lists for future recall and results presentation. Selecting the type of test is done at the press of a button and the testing parameters such as impact hammer weight, impact velocity and sample size are entered to give the required testing conditions. At start of each batch of tests, a simple calibration of the apparatus is conducted for bearing resistance and windage and after each test sample has been tested, the results are displayed on the LCD giving the impact energy in Joules. Batch statistics of mean, standard deviation and co-efficient of variation are automatically updated after each test and results are shown in graphical and tabular format for analysis when downloaded to the supplied **Techni-Test** PC software. For quality control purposes High and Low limits can be defined when test results are downloaded showing the user instantly if the material is a pass or fail.

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# FALLING WEIGHT IMPACT TESTER

FALLING WEIGHT IMPACT TESTER (RR/FWT)

## UNIVERSAL FALLING WEIGHT IMPACT TESTER

Designed and built with operator simplicity in mind, the Ray-Ran **Universal Falling Weight Impact Tester** is simply the best in its class. It is used to determine the energy required to break or rupture test specimens such as pipe, sheet, laminates, composites, ceramics and non ferrous metals for material and component evaluation to international testing methods such as ISO6603, ISO3127 and ASTM D2444 to name a few

Utilising both pneumatic and electrical functions, the apparatus is extremely versatile. The standard machine is supplied with a 2 meter variable drop height system which can reach impact velocities up to 6.26 m/s. With an impact energy range of up to 314 joules, even the toughest of materials can easily be tested.

Built with operator safety in mind, the apparatus has a full electrical interlock system preventing operation of the apparatus if a safety guard is open. It is supplied as standard with a solenoid operated carrier release mechanism for simple operation and a unique pneumatic carrier return system to ensure the carrier is safely returned to its set drop height for the next test to be performed.





A twin guide rail system is used to ensure a smooth repetitive drop of the load carrier perpendicular to the sample being tested. Load carriers are available for different energy ranges and are fitted with low friction bearing guides which prevent velocity and potential energy being lost as the carrier descends. Impact tups are supplied to international test standard methods, or to customers own individual requirements, which can simulate the mode of failure in actual service conditions or to analyse specific in-house quality control standards.

To conduct a test, prepared samples are placed in the enclosed chamber on their supporting fixture which can be adjusted vertically to accommodate different test sample sizes. On the standard machine pipe diameters of up to 400mm Ø can be tested easily. If the optional pneumatic clamping fixtures are used, the integrated safety system of the apparatus ensures that the clamp does not operate until the cabinet door is in the closed position.

## THE METHODS OF TESTING ON THE *UNIVERSAL FALLING WEIGHT IMPACT TESTER* ARE:

### Round the Clock Method

Lengths of pipe from a batch or production run are subjected to blows from a known mass which falls from a specified height as per test standard ISO 3127 & EN744.

### Staircase Method

Lengths of pipe are subjected to blows from a known mass and shape but is dropped from differing heights depending on the results of each blow as per test standard EN1411.

The **Universal falling Weight Impact Tester** is ideal for product development and quality control within production, research and development labs and teaching institutions and will more than meet your testing requirements. Various drop heights are available as well as larger bases to accept larger pipe diameters and Tup (Striker) shapes to customers individual requirements.

## FALLING WEIGHT IMPACT TESTER (RR/FWT)

### TECHNICAL SPECIFICATION

- 2 meter drop height test machine
- Twin guide rail system
- Low friction carrier bearing system
- Solenoid release mechanism
- Pneumatic carrier return
- Mechanical raise/lower fixture platform
- Pipe, sheet, Izod, Charpy, Tension, Component testing compatible.
- Variable velocity up to 6.26 m/s
- Impact energies up to 314 Joules
- Electrical safety interlock
- 110 or 240 volt available
- Operating pressure 100 PSI (7 bar)
- Conforms to ISO6603, ISO3127 and ASTM D2444, etc
- Product user manual
- CE declaration certificate
- Traceable calibration certificate
- 1 year return to base warranty

### OPTIONAL ANCILLARIES

- Extended drop height
- Increased chamber capacity
- "V" rest pipe fixture 12mm – 75mm dia
- "V" rest pipe fixture 75mm – 400mm dia
- Plate or Plaque specimen holder (manual clamp)
- Plate or Plaque specimen holder (Pneumatic clamp)
- Izod Fixture
- Charpy Fixture
- Customized Fixtures
- Anti-rebound device
- Drop Height Power Feed Adjustment
- Digital Height Scale
- Velocity indicator
- Drop weight carriers from 0.5kg – 16kg as standard
- Customized drop weight carrier
- Impact Heads (Tups) to International test standards
- Customized Impact Heads (Tups)
- Variable weight system
- Low Temperature Chamber

### WEIGHTS & DIMENSIONS: RR/FWT

Net Weight (kg)	270*
Width (cm)	950*
Depth (cm)	450*
Height (cm)	2500*

\*standard 2 meter drop height machine

## AVAILABLE OPTIONS

### ANTI REBOUND

The apparatus can be supplied with an electrically operated anti-rebound system to prevent the load carrier rebounding on to the sample after its initial impact preventing further damage to the test specimen.

### DIGITAL HEIGHT SCALE

This optional feature can be fitted to accurately determine the drop height of your weight carrier. The fitted LED digital readout clearly displays the drop height in mm or inches.

### DROP HEIGHT POWER FEED ADJUSTMENT

To further enhance the apparatus, an optional powered lift can be fitted to raise and lower the drop height settings. This feature is especially useful if your testing drop heights are in excess of 2 meters.

### VELOCITY INDICATOR

Fitted as an option, this device accurately determines the falling velocity of the weight carrier making impact energy calculations even more precise.

# UNIVERSAL FALLING WEIGHT IMPACT TESTER

### FIXTURES

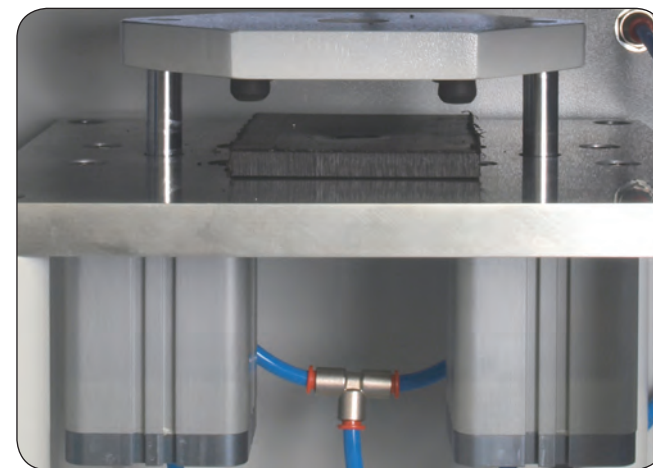
By changing the supports and clamping mechanisms, along with the shape of the Tup, and variable weights the Ray-Ran **Universal Falling Weight Impact Tester** can be manufactured to meet any test specification or customers requirement making the equipment truly bespoke. Typical test fixtures available include

### PIPE TESTING "V" REST

The test is used for the examination of pipe sections and tubing for impact strength properties as complete segments of pipe. Sample diameters from as little as 12mm Ø up to 400mm Ø can be tested on the standard machine. The pipe is supported in a 120° angled "V" support as is impacted by the load carrier in a single drop. The support rests can be manufactured to any test standard or customer requirement.

### FLAT PLATE / PLAQUE TESTING

Testing of flat plates or plaques such as laminates and



composites can easily be tested using the flat plate clamping fixture. It is offered with various support rings to test to various international test standards and customers own specific testing requirements and can be either manually or pneumatically operated.

Fixtures for conducting **Izod** and **Charpy** tests are also available.

For specific component testing Ray-Ran can design and manufacture bespoke clamping fixtures to meet customers individual testing requirements and parameters.









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# ADVANCED HDT/VICAT SOFTENING POINT





# ADVANCED HDT/VICAT SOFTENING POINT APPARATUS 2 & 4 STATION

Designed and built to cover multiple international testing standards, the Ray-Ran **Advanced HDT/Vicat Apparatus** utilises microprocessor technology to accurately determine the deflection and

softening point characteristics of all thermo plastic test specimens.

The HDT/Vicat apparatus allows for multiple simultaneous testing of samples depending on the amount of test stations available, either 2 or 4. The simple manually operated raise and lower function of the test stations ensure easy access to the test sample supports for sample loading and retrieval before and after each test. Each test station is fitted with a PT100 platinum resistance thermometer which accurately records the temperature next to the sample under test to 0.1°C and an electronic displacement transducer which measures the sample displacement to 0.01mm as standard or to 0.001mm as an option. The on board microprocessor ensures test result accuracy and repeatability and the built in liquid crystal display (LCD) provides simple on screen instructions reducing user error. Test parameters are easily selected using the onboard membrane keypad. A simple data selection process and yes/no prompts make the operating procedure very simple to undertake. The microprocessor's temperature control function ensures the ramping rates of either 50°C/h or 120°C/h are kept within the specified test standard requirements as well as performing non standard ramp rates to customers own specific needs. Test

temperatures of 300°C are easily achieved and to ensure optimum safety at higher temperatures, the Nitrogen Blanket option is recommended.

## THE METHODS OF TESTING AVAILABLE ON THE APPARATUS ARE

### HDT - Heat deflection / distortion test

A standard sized test specimen is subjected to a bending stress, whilst the temperature is raised at a uniform rate. The temperature at which the specified deflection occurs is measured and recorded. Testing is carried out in accordance with the ISO 75 (parts 1, 2 and 3) and ASTM D648 Test Standards.

For this test, a required fibre stress of 0.45, 1.8, or 8.00 MPa is easily selected. Custom fibre stresses can also be managed by the microprocessor if required. The unique binary weight system is used to apply the required fibre stress to the test sample and is automatically calculated by the microprocessor based on the sample size and span supports. Temperature ramp rates, sample size, span and deflection values are also easily entered into the testing parameters of each station. The HDT span supports of 100mm or 64mm are easily adjusted on each tool station to suite your testing method of **Flat wise** or **Edgewise** sample testing. Each machine is supplied with HDT test nibs with 3mm radius which are easily attached to the load displacement rods for testing in accordance with relevant international test standards.



## ADVANCED HDT/VICAT SOFTENING POINT APPARATUS (RR/HDV2 – RR/HDV4)

### TECHNICAL SPECIFICATION

- HDT/Vicat testing enabled
- Manual Raise/Lower of test stations
- Advanced microprocessor control
- 2 or 4 sample test stations
- Digital temperature control
- Temperature range to 300°C
- Oil bath stirrer
- Solenoid operated cooling system
- Integrated safety thermostat
- HDT Heads (1 per station)
- Vicat Nibs (1 per station)
- Standard Fibre Stress 0.45, 1.8 or 8.00 MPa
- Used defined fibre stress for HDT testing available
- Standard Vicat penetration of 0.1mm or 1.00mm
- User defined penetration depth
- for Vicat testing available
- Temp resolution +/- 0.1°C
- Temperature ramp rates of 50° or 120° C/hr
- User defined ramp rates available
- HDT span supports 64mm or 100mm
- Resolution +/- 0.01mm
- Bath capacity 8 litres
- RS 232 connection/RS232 Cable
- Windows File Capture Software
- Fully traceable certificate of calibration
- Product user manual
- CE declaration certificate
- 1 year return to base warranty
- 110v – 240v 16amp
- Conforms to ISO 75-1, 75-2, 75-3, 306 and ASTM D648, D1525, D5944, D5945

### OPTIONAL ANCILLARIES

- Displacement Transducer 0.001mm
- Binary HDT Test Weights (1 set required per station)
- 1.00Kg Vicat Test Weight (1 required per station)
- 5.00Kg Vicat Test Weight (1 required per station)
- Light Weight Load rods to test to .45 MPa
- Heat Transfer Medium 5ltrs
- Nitrogen Blanket
- Air to Nitrogen Extractor
- Thermal Printer
- Thermal Printer Paper
- Water Chiller Unit

### WEIGHTS & DIMENSIONS: HDT/VICAT SOFTENING POINT APPARATUS

	HDV2	HDV4
Net Weight (kg)	25	40
Width (cm)	36	46
Depth (cm)	53	53
Height (cm)	50	50

**RAY-RAN**

### Vicat (VST) - Softening point test

A specified needle (indenter) penetrates a specified distance into a sample with a specified load, whilst the temperature is raised at a uniform rate. The temperature at which the sample was penetrated is recorded as the Vicat Softening Temperature (VST). Testing is carried out in accordance with the ISO 306 and ASTM D1525 Test Standards.

For this test, penetration loads are easily selected via the microprocessor for use with the single loading weights of 10 N and 50N. The supplied cylindrical indenter test nib with 1mm<sup>2</sup> surface area is attached to the load displacement

rod for sample testing in accordance with relevant testing standard.

The apparatus is supplied as standard with an integrated solenoid operated cooling system which is automatically activated after each test. It can be connected to either a standard water supply or to the optional chiller unit for improved heat reduction. The integrated cooling coil ensures rapid heat loss back to start temperature conditions within a short time period increasing production.

The self calibration feature of the apparatus ensures that the test results remain accurate. Unique calibration plugs are supplied with each machine which simply plug into the PRT socket for you to carry out the calibration procedure.

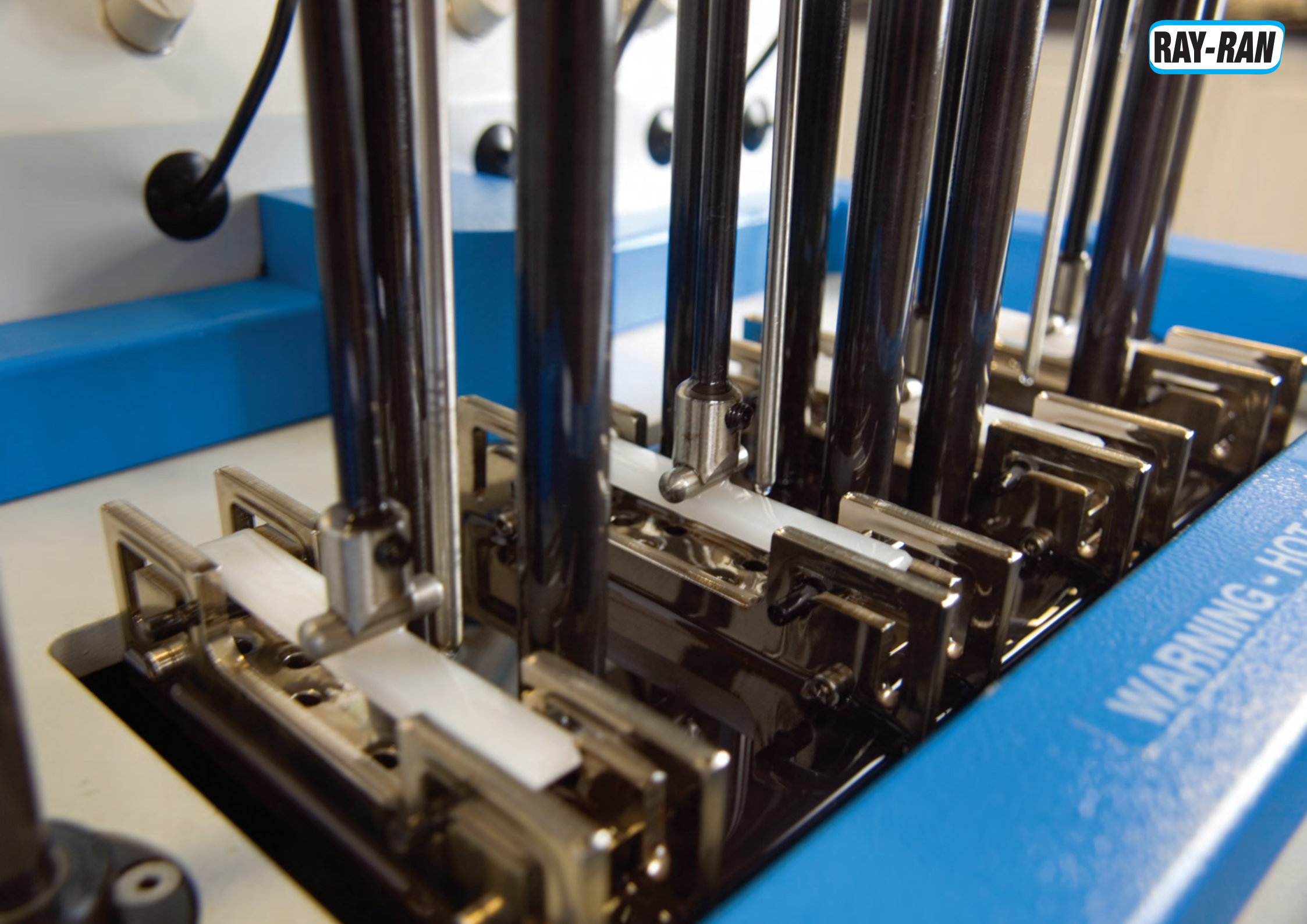
Test results are downloaded to the supplied file capture software via the RS232 serial connector and are displayed in tabular format. Results can also be saved as .CSV files which can be opened with Microsoft Excel for data manipulation and report presentation. If required, the optional thermal printer can be supplied and fitted to the apparatus for direct results printout.

Built with operator simplicity in mind, its ease of operation and high accuracy makes the Ray-Ran Advanced HDT/Vicat Apparatus ideal for product development and quality control within production, research and development labs and teaching institutions and should more than meet all of your testing requirements.





**RAY-RAN**



WARNING - HOT

## TECHNICAL SPECIFICATION

- HDT/Vicat testing enabled
- Advanced microprocessor control
- Power rise and fall of test stations
- Dual pump stirrer system
- 6 sample test stations
- Digital temperature control
- Temperature range to 300°C
- Solenoid operated cooling system
- Integrated safety thermostat
- HDT Heads (1 per station)
- Vicat Nibs (1 per station)
- Standard Fibre Stress 0.45, 1.8 or 8.00 MPa
- Used defined fibre stress for HDT testing available
- Standard Vicat penetration of 0.1mm or 1.00mm
- User defined penetration depth for Vicat testing available
- Temp resolution +/- 0.1°C
- Temperature ramp rates of 50° or 120° C/hr
- User defined ramp rates available
- HDT span supports 64mm or 100mm
- Resolution +/- 0.01mm
- Bath capacity 18 litres
- Built in printer
- RS 232 connection & cable
- Windows data logging software
- Fully traceable certificate of calibration
- Product user manual
- CE declaration certificate
- 1 year return to base warranty
- 240v 16amp
- Conforms to ISO 75-1, 75-2, 75-3, 306, and ASTM D648, D1525, D5944, D5945

## OPTIONAL ANCILLARIES

- Displacement Transducer 0.001mm
- Binary HDT Test Weights (1 set required per station)
- 1.00Kg Vicat Test Weight (1 required per station)
- 5.00Kg Vicat Test Weight (1 required per station)
- Light Weight Load rods to test to .45 MPa
- Heat Transfer Medium 5ltrs
- Nitrogen Blanket
- Air to Nitrogen Extractor
- Water Chiller unit

## WEIGHTS & DIMENSIONS: HDT/VICAT SOFTENING POINT APPARATUS (HDV6)

Net Weight (kg)	50
Width (cm)	90
Depth (cm)	60
Height (cm)	40

# ADVANCED 6 STATION HDT/VICAT SOFTENING POINT APPARATUS

For maximum testing capability look no further than the Ray-Ran **Advanced 6 Station HDT/Vicat**

**Apparatus.** Built for multiple simultaneous testing of 6 samples to HDT or Vicat testing methods, the apparatus uses dedicated microprocessor technology to accurately determine the deflection and softening point characteristics of all thermo plastic test specimens. Its operator simplicity and high accuracy, makes the apparatus ideal for product development and quality control and has been designed to meet multiple International Testing Standards.

On start up the advanced on board microprocessor starts work immediately by conducting a self diagnostic procedure to ensure test result accuracy and reliability. The built in liquid crystal display (LCD) provides simple on screen instructions and test parameters are easily selected using the onboard membrane keypad. A simple data selection process using yes/no prompts make the setup and operating procedure very simple to undertake and reduces user error and operator training. The microprocessor's temperature control function

ensures the ramping rates of either 50°C/h or 120°C/h are kept within the specified test standard requirements as well as performing non standard ramp rates to customers own specific needs

Each test station is fitted with a PT100 platinum resistance thermometer, which accurately records the temperature next to the sample under test to 0.1°C and an electronic displacement transducer, which measures the sample





## SAMPLE & COMPONENT TESTING

displacement to 0.01mm as standard or to 0.001mm as an option.

The integrated power raise and lower function of the test stations ensures safe easy access to the test sample supports for sample loading and retrieval before and after each test. For maximum temperature stability across each of the test stations the apparatus is fitted with a dual pump oil stirrer system. Test temperatures of 300°C are easily achieved and to ensure optimum safety at higher temperatures, the Nitrogen Blanket option is recommended.

The apparatus is supplied, as standard with an integrated solenoid operated cooling system which is automatically activated after each test. It can be connected to either a standard water supply or to the optional chiller unit for improved heat reduction. The integrated cooling coil ensures rapid heat loss back to start temperature conditions within a short time period increasing production.

The one touch self calibration feature of the apparatus ensures that the machine and test results remain accurate. A unique calibration interface unit is supplied with each machine that is simply connected to the apparatus for you to carry out the calibration procedure.

The apparatus is supplied, as standard with advanced data logging software which connects via the RS232 serial interface connector. The software records the temperature/deflection profile of each station in real time during a test. Test results are displayed in tabular format and reports can easily be generated by the software for results presentation. If required, test results can also be saved as .CSV files which can be opened with Microsoft Excel for data manipulation, further report presentation or for importing into customer specific software.





**RAY-RAN**

# COLD FLEX TESTER





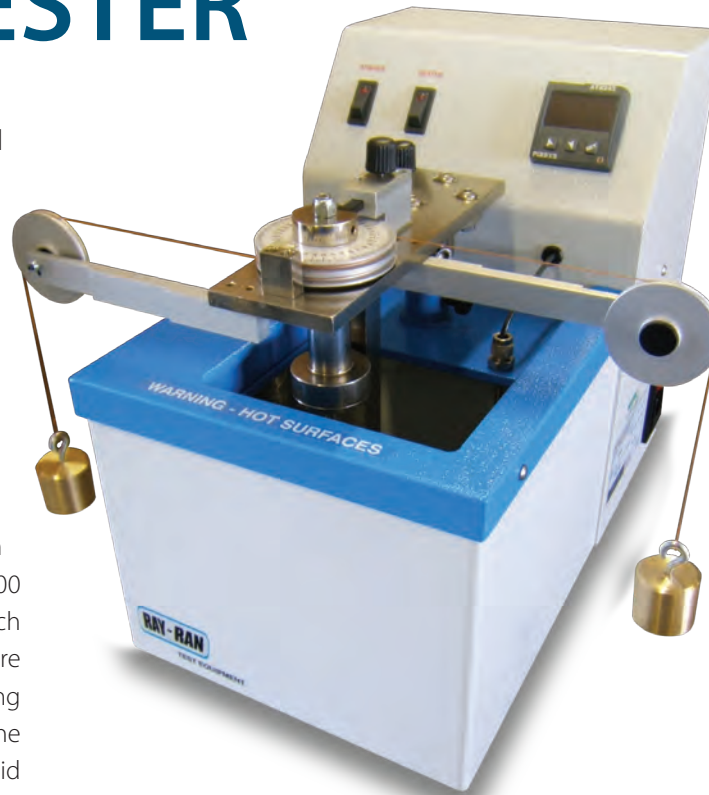
# COLD FLEX TESTER

Designed and built by Ray-Ran, the **Cold Flex Tester** determines how low temperatures affect the torsional stiffness properties of flexible materials, including polyvinyl chloride extrusion compounds, by measuring the temperature at which a test specimen is twisted through a known angular displacement using a pulley system by a specified torque. The apparatus complies with BS2782: Part 1: Method 104B, ISO458/1, 458/2 and ASTM D1043 International Test Standards.

The apparatus consists of a low temperature bath with electronic PID temperature controller, heater and a PT100 platinum resistance thermometer accurate to 0.1°C which accurately controls the heating cycle of the test. To ensure temperature stability within the bath during the cooling and heating cycle, a stirrer motor system is also fitted to the apparatus. Suitable means should be used to ensure the liquid medium can be lowered to the test temperatures required such as adding solid carbon dioxide (dry ice).

The specimen clamping mechanism is manufactured from stainless steel and has one fixed side with the other side mounted in low friction bearings which is allowed to rotate. The torque is applied to the test sample by placing known weights to the pulley system which causes the clamped test specimen to rotate or twist about its vertical axis. Angular deflection measurements (in degrees) are then taken from the integrated radial dial indicator.

The actual test is very simple to conduct. The temperature



of the bath is lowered to a temperature that will cause the sample to approximately twist a known angle of deflection. Heat or increased torque is then applied to the sample to increase its twist to a given angle of deflection subject to the international Test Standard you are working to. From the temperature and the angle of deflection readings taken, the apparent torsional modulus of elasticity can be determined.

Simple and unique, this apparatus has become a valuable addition to the Ray-Ran product range of materials testing equipment.

## COLD FLEX TESTER (RR/CFT)

### TECHNICAL SPECIFICATION

- Measures apparent torsional modulus of elasticity
- Integrated low temperature bath
- PID electronic temperature control
- Resolution 0.1°C
- PT100 PRT sensor accurate to 0.1°C
- Integrated stirrer motor
- Stainless steel clamping mechanism
- Low friction bearing assembly
- Integrated radial dial indicator (degrees)
- Torque load weights supplied
- Product user manual
- CE declaration certificate
- 1 year return to base warranty
- 110v 60Hz – 240v 50Hz
- 10 amp
- Complies with BS2782: Part 1: Method 104B,
- ISO458/1 & 458/2
- ASTM D1043

### OPTIONAL ANCILLARIES

- Heat transfer medium (silicone oil) 10 ltrs

### WEIGHTS & DIMENSIONS: RR/CFT

Net Weight (kg)	15
Width (cm)	30
Depth (cm)	45
Height (cm)	40

**RAY-RAN**

# LOW TEMPERATURE BRITTLENESS TESTER





# LOW TEMPERATURE BRITTLINESS APPARATUS

The Ray-Ran **Low**

## Temperature

### Brittleness Tester

has been designed to study the effects low temperatures have on plastic materials when subject to impact loads and conforms to ASTM D746 and ISO R974 International Test Standards. Many materials which are flexible at normal ambient temperatures become brittle at low temperatures which severely affect the materials impact strength. By plotting the percentage failure rate of the test samples against the reduction in temperature, the brittleness temperature of the test samples can be determined.

The apparatus consists of a low temperature bath with electronic PID temperature controller and a PT100 platinum resistance thermometer accurate to 0.1°C which accurately controls the heating cycle of the test and records the temperature next to the test samples. Precise temperature control is readily achieved by means of a built-in heater which, in conjunction with controlled addition of refrigerant,



enables any temperature down to -70 °C to be readily attained and held. To ensure temperature stability within the bath during the cooling and heating cycle a stirrer motor system is also fitted to the apparatus. Suitable means should be used to ensure the liquid medium can be lowered to the test temperatures required, such as adding solid carbon dioxide (dry ice) to Methyl Alcohol.

The test procedure is very simple to conduct and a sufficient number of test specimens should be tested so the Brittleness Temperature can be calculated on a statistical basis. Test specimens are clamped in a stainless steel cantilever beam fixture which is immersed into the low temperature bath. The specimens are allowed to condition at a maintained temperature in the heat transfer medium and are then simultaneously subjected to a single blow given by a free falling pendulum impact hammer through the means of an intermediate striker at a constant velocity of 2.1 m/s. The samples are then removed and examined to determine whether failure has occurred. Temperatures are then increased or decreased to find the temperature at which 50% of the specimens fail. This is defined as the Brittleness Temperature.

## TECHNICAL SPECIFICATION

- Low temperature brittleness determination
- Integrated low temperature bath
- PID electronic temp control
- Resolution 0.1°C
- PT100 PRT sensor accurate to 0.1°C
- Integrated stirrer motor
- Temperature range - 70°C to 100°C
- Stainless steel cantilever clamp
- Easy specimen removal
- Manual pendulum release
- Low friction bearing assembly
- Integrated specimen striker head
- Impact velocity 2.1 m/s
- Test sample cutting die
- Product user manual
- CE declaration certificate
- 1 year return to base warranty
- 110v 60Hz – 240v 50Hz
- 10 amp
- Product user manual
- CE declaration certificate
- 1 year return to base warranty
- Complies with: ISO 974 AND ASTM D746

## OPTIONAL ANCILLARIES

- Specimen cutter Type A
- Specimen cutter Type B
- Specimen cutter Type C
- Specimen Clamps to ISO or ASTM test standard.

## WEIGHTS & DIMENSIONS: RR/LTB

Net Weight (kg)	35
Width (cm)	60
Depth (cm)	25
Height (cm)	50

**RAY-RAN**

# ENVIRONMENTAL STRESS CRACKING APPARATUS





# ENVIRONMENTAL STRESS CRACKING APPARATUS

## The Ray-Ran **Environmental Stress Cracking Apparatus**

determines the susceptibility of ethylene plastics to stress-cracking when exposed to different environments such as soaps, wetting agents, oils and detergents. When the material is under certain conditions of stress, these reagents can accelerate the cracking process which is one of the most common causes of unexpected brittle failure of polymers known. Designed in accordance with the ASTM D1693 international test standard, the apparatus is extremely cost effective and very simple to use.

Manufactured to a high standard, the apparatus is supplied with electronic digital temperature control, temperature bath and all tooling accessories. The integrated temperature bath fitted with digital temperature controller, heater and a PT100 platinum resistance thermometer accurately maintains the test temperature, usually 50 °C or 100 °C  $\pm$  0.5 °C. To ensure temperature stability within the bath, a stirrer motor system is fitted and the built in electronic timer monitors the duration of the test. The bath is fitted with a stainless steel sample rack which holds up to 48 glass test tubes which are immersed in



a heat transfer medium such as silicone oil. Rubber stoppers to seal the tubes and test sample specimen holders in either stainless steel or brass (optional) are also supplied for each tube. The specimen holder is designed to maintain a constant stress on the mid section of the test samples with up to 10 specimens fitted into a specimen holder at one time.

## THE UNIQUE SET OF TOOLING ACCESSORIES REQUIRED TO PRODUCE YOUR TEST SAMPLES INCLUDE:

- **TEST SAMPLE CUTTER** – 38 mm x 13 mm.
- **SAMPLE NICKING JIG** – Used to make a controlled imperfection in the test sample.
- **SAMPLE BENDING CLAMP** – Used to induce a concentrated stress in the sample.
- **SAMPLE TRANSFER TOOL** – Used to move test samples from the bending clamp into the specimen holders.

To conduct a test, the material is cut to the required shape and shape and marked with a concentrated notch. An induced stress is made on the sample and it is place into the test sample rack and moved to the test tube which is filled with the test reagent and placed into the test bath at a constant temperature. At timed intervals, the samples are checked for any cracks developing at 90° to the notch. The number of failures is recorded.

## TECHNICAL SPECIFICATION

- Simple determination of Stress Cracking
- PID electronic temperature control
- Resolution 0.1°C
- PT100 PRT sensor accurate to 0.1°C
- Integrated stirrer motor
- Electronic timer HR:MIN:SEC
- Stainless steel liquid bath
- Sample cutter
- Sample nicking jig
- Sample bending clamp
- Sample specimen holders (Stainless Steel)
- 48 glass test tubes
- Rubber stoppers
- Product user manual
- CE declaration certificate
- 1 year return to base warranty
- Conforms to ASTM D1693

## OPTIONAL ANCILLARIES

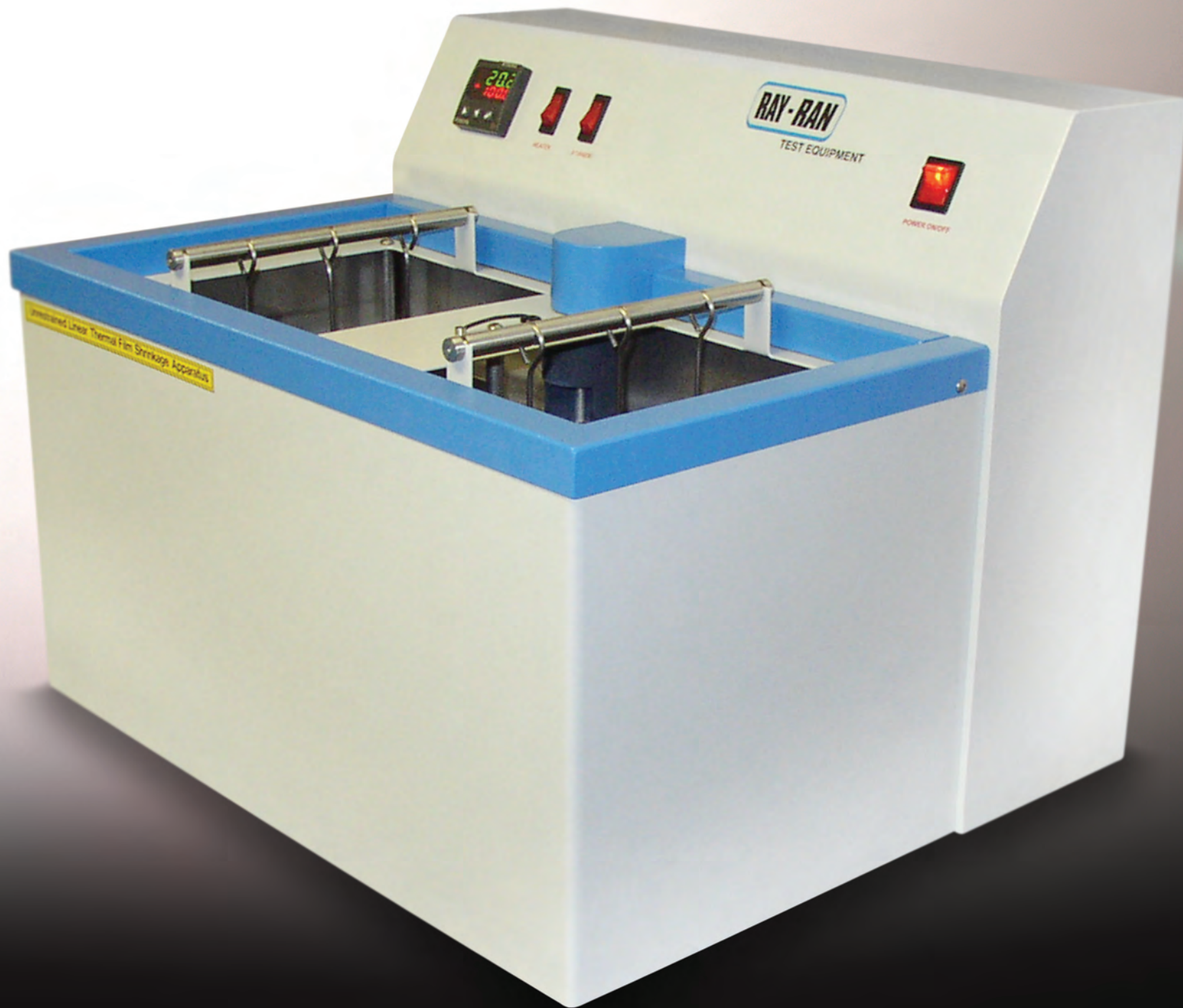
- Sample specimen holders (Brass)

## WEIGHTS & DIMENSIONS: RR/ESC

Net Weight (kg)	25
Width (cm)	50
Depth (cm)	40
Height (cm)	50

**RAY-RAN**

# UNRESTRAINED LINEAR THERMAL FILM SHRINKAGE LIQUID IMMERSION METHOD





# UNRESTRAINED LINEAR THERMAL FILM SHRINKAGE LIQUID IMMERSION METHOD

Designed and manufactured by Ray-Ran, the **Unrestrained Linear Thermal Film Shrinkage** apparatus

or more commonly referred to as the liquid immersion method, is used to determine the thermal shrinkage of plastic film & sheeting.

As a result of manufacturing processes, internal stresses may be locked into a film or sheet which can be released by heating which causes shrinkage of the material. The amount of shrinkage which takes place is dependent on the temperature during the test. The results are plotted on a graph showing percentage shrinkage against temperature.

Manufactured to a high standard, the apparatus is supplied with electronic digital temperature control, temperature bath and all tooling accessories.

The integrated temperature bath fitted with digital temperature controller, heater and a PT100 platinum resistance



thermometer accurately maintains the test temperature to within  $\pm 0.5^{\circ}\text{C}$ . To ensure temperature stability within the bath, a stirrer motor system is fitted and the built in electronic timer monitors the duration of the test.

The apparatus comes as standard with stainless steel specimen holders which hold the film samples of 100mm x 100mm square. A sample cutting template of the same size is also supplied to ensure that the test samples are accurately cut to the required test dimensions.

To conduct a simple test, the apparatus is heated to test temperature and the test samples immersed in the temperature bath medium. After 10 seconds they are removed and allowed to cool back to room temperature. A measurement of the sample is taken longitudinal and transverse directions and the percentage shrinkage calculated.

## THERMAL FILM SHRINKAGE LIQUID IMMERSION METHOD (RR/FSL)

### TECHNICAL SPECIFICATION

- Simple determination of Unrestrained Film Shrinkage
- Liquid immersion method
- Simple to operate
- PID electronic temperature control
- Resolution  $0.1^{\circ}\text{C}$
- PT100 PRT sensor accurate to  $0.1^{\circ}\text{C}$
- Integrated stirrer motor
- Electronic timer HR:MIN:SEC
- Stainless Steel liquid bath
- Sample cutting template 100mm x 100mm
- 6 off Sample specimen holders (Stainless Steel)
- Product user manual
- CE declaration certificate
- 1 year return to base warranty
- Conforms to ASTM D2732

### OPTIONAL ANCILLARIES

- Sample specimen holders (Stainless Steel)

### WEIGHTS & DIMENSIONS: RR/FSL

Net Weight (kg)	25
Width (cm)	50
Depth (cm)	40
Height (cm)	50

**RAY-RAN**

# UNRESTRAINED LINEAR THERMAL FILM SHRINKAGE HOT PLATE METHOD





# UNRESTRAINED LINEAR THERMAL FILM SHRINKAGE HOT PLATE METHOD

Designed and manufactured by Ray-Ran, the **Hot Plate Thermal Film Shrinkage** Apparatus is used to determine the thermal shrinkage of plastic film & sheeting and is ideal for most quality control procedures where precise results are essential.

The principal of the hot plate method to determine film shrinkage is similar to the liquid immersion method, notably to determine the amount of shrinkage of a film when heated to release the internal stresses produced due to the manufacturing methods.

The integrated hot plate with digital temperature controller, heater and a PT100 platinum resistance thermometer accurately maintains the test temperature to within  $\pm 0.1^\circ\text{C}$  and the built in electronic timer monitors the duration of the test.

The hot plate test procedure is very simple and quick to conduct. A film sample of round or rectangular shape is placed on a hot plate which is maintained at a constant temperature. The surface of the hot plate is lightly oiled with silicone oil to ensure good heat transfer from the hot plate to the film and a light cover plate which keeps the film flat is placed on the top of the film sample. After a set time, the film is removed from



the hot plate and cooled to room temperature. It is then re-measured and its percentage shrinkage determined.

Although the Hot Plate Film Shrinkage Apparatus is not controlled by any international test standards, its economical features and high temperature accuracy make it a valuable piece of testing equipment within the polymer industry.

## THERMAL FILM SHRINKAGE HOT PLATE METHOD (RR/FSHP)

### TECHNICAL SPECIFICATION

- Simple determination of Unrestrained Film Shrinkage
- Hot plate method
- Simple to operate
- PID electronic temperature control
- Resolution  $0.1^\circ\text{C}$
- PT100 PRT sensor accurate to  $0.1^\circ\text{C}$
- Electronic timer HR:MIN:SEC
- Sample cover plate
- Product user manual
- CE declaration certificate
- 1 year return to base warranty

### OPTIONAL ANCILLARIES

- Test sample cutter  $\varnothing 50\text{mm}$
- Test sample cutter  $50\text{mm} \times 50\text{mm}$
- Silicone oil (100ml bottle)

### WEIGHTS & DIMENSIONS: RR/FSHP

Net Weight (kg)	6
Width (cm)	20
Depth (cm)	30
Height (cm)	25

**RAY-RAN**

# ELMENDORF TEAR TESTER





# ELMENDORF TEAR TESTER

The **Elmendorf Tear Tester** offered by Ray-Ran is a powerful and versatile instrument designed for accurately testing not only textiles and nonwovens, but a wide variety of similar materials, including paper, board and plastic. It has been designed with contemporary styling and sophisticated controls that simplify and accelerate routine tear testing procedures.

The instrument's intelligent operating system is equipped with industry-specific features and terminologies for the user's convenience and ease of operation. For simplicity the operator selects the unit of measurement and the number of plies using a state of the art LCD touch screen display. Visible and audible indicators also confirm valid test results or signal the need to change the number of plies and/or the pendulum weight.

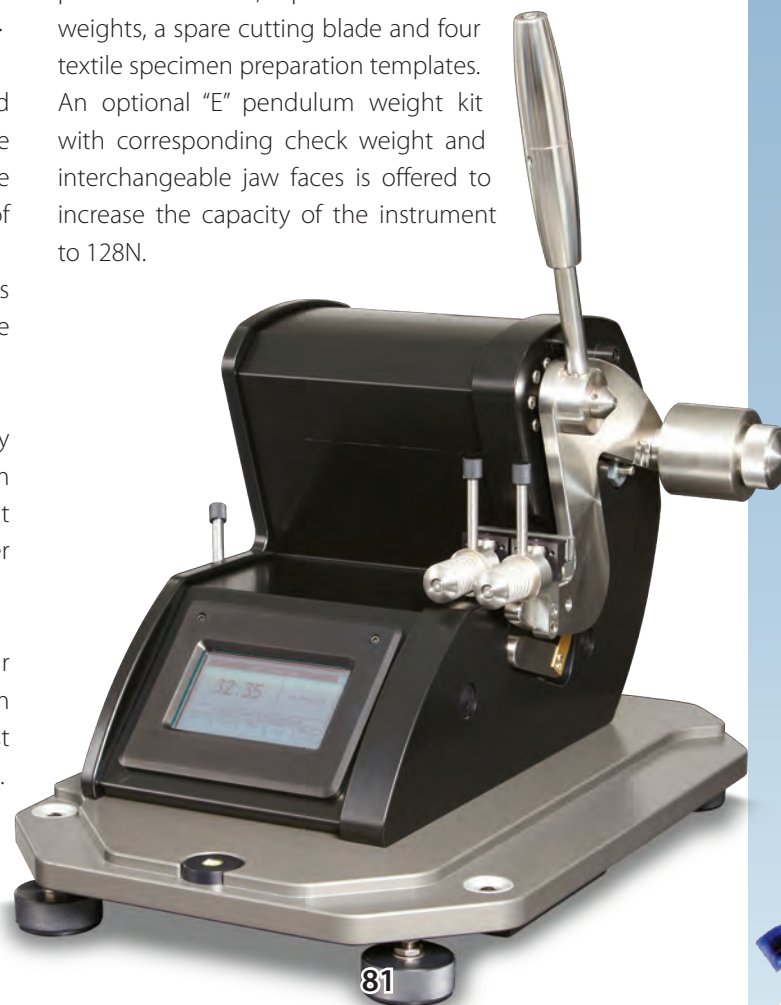
Another major feature of the apparatus is the quick and easy specimen clamping fixture which uses innovative rotary cam locking jaws and the built in automatic pendulum weight detection system with automatic zeroing which further reduces operator error.

During the test procedure the operation of Elmendorf Tear Tester is intrinsically safe. The electrical interlock system requires both hands to release the pendulum and after a test has been conducted, the pendulum is automatically arrested.

Test results are displayed automatically after each test ensuring no complicated calculations have to be made. Statistical analysis is possible without the need of

connection to a computer, however the optional PC software package is designed to provide tools for saving, recalling, deleting and printing test results.

The Elmendorf Tear Tester is supplied complete with a full set of pendulum weights equivalent to the traditional pendulums A-D, pendulum check weights, a spare cutting blade and four textile specimen preparation templates. An optional "E" pendulum weight kit with corresponding check weight and interchangeable jaw faces is offered to increase the capacity of the instrument to 128N.



## ELMENDORF TEAR TEST (RR/ETT)

### TECHNICAL SPECIFICATION

- LCD graphics touch-screen
- User friendly software
- Units of measurement N, cN, mN, kgf, gf, lbf, ozf
- Angular resolution 0.09 degrees
- Number of specimens (plies) 1 to 16
- Maximum specimen thickness 5mm
- Cut length 15mm or 20mm
- Tear length 43mm
- Pendulum weights (A-D) 8N, 16N, 32N, 64N
- Calibration check weights for each pendulum
- Automatic pendulum weight detection
- Automatic zeroing
- Two-handed pendulum release
- Automatic pendulum arrest
- Sample 'notched' sensor
- Interchangeable jaw faces (E Kit only)
- Visual and audible limits warnings
- 4 Sample preparation templates
- USB PC connection
- Power Supply 85 - 264VAC 50/60Hz 60W
- Product user manual
- CE declaration certificate
- 1 year return to base warranty

### CONFORMS TO:

- **Textile:** ASTM D 1424, DIN 53862, EN ISO 13937-1, ISO 4674-2 AND ISO 9290, M&S P29, NEXT 17, NF G07-149
- **Paper:** APPITA P 400, ASTM D 689, BS 4468, CSA D9, DIN 53128, EN 21974, GB/T 455, ISO 1974, JIS P 8116, PAPTAC D9 AND SCAN P11, SNV 198482, TAPPI T414, UNI 6444
- **Plastics:** ASTM D 1922, GB/T 11999, ISO 6383-2, JIS K 7128-2, NF T54 141
- **Nonwovens:** ASTM D 5734, WSP 100.1

### OPTIONAL ANCILLARIES

- PC software package
- Pendulum Weight Kit (E) 128N with Interchangeable jaw faces

### WEIGHTS & DIMENSIONS: RR/ETT

Net Weight (kg)	57
Width (cm)	40
Depth (cm)	50
Height (cm)	55

**RAY-RAN**

# THERMAL AGEING





# THERMAL AGEING APPARATUS

The **6 Cell Thermal Ageing Apparatus** has been designed by Ray-Ran to study the thermal endurance characteristics of polymer materials and their ageing process by passing a constant flow of heated air over individual test samples. At set time intervals, the test samples are removed and inspected for any deterioration or degradation, making the apparatus ideal for research and development labs and product design. Designed in accordance with BS 903, BS 6746, BS 5691 and ASTM E95 international test standards, the apparatus is extremely cost effective and very simple to use.

The apparatus consists of 6 individual test cells with up to 8 samples per cell, thus allowing 48 simultaneous tests to be undertaken. The test samples are suspended in a controlled environment with temperature controlled air continually being circulated through each test cell at a constant flow rate. The test samples are checked for thermal ageing at set time intervals and the condition recorded.

The apparatus has an integrated temperature bath fitted with digital temperature controller, heater and a PT100 platinum resistance thermometer which accurately maintains the test temperature. To ensure an even temperature distribution across each of the six partially submerged stainless steel cells, two Archimedean type pumps are fitted to increase temperature stability within the bath. The air flow through each cell is heated via coils submerged in a heat transfer



medium and enters the cell through a diffuser nozzle for even air flow distribution. For safety, the apparatus is fitted with an over temperature thermostat which switches off the apparatus if it over heats.

The temperature of each cell is measured by a 3 wire platinum resistance thermometer sensor and is displayed on a switched digital temperature indicator. The temperature accuracy of each individual cell is 0.5°C. Sample support holders are also provided so test samples can be suspended in each cell prior to testing.

To ensure an accurate constant flow of air across the test sample, each cell is fitted with a flow meter which regulates the air flow input between 50-500 cm<sup>3</sup>/min. A single flow meter is also used to measure the air flow output from each cell. To monitor the duration of each test cell, the apparatus is also fitted with 6 individual hour counters which are set when the test is started.

## THERMAL AGEING APPARATUS (RR/TAA)

### TECHNICAL SPECIFICATION

- Integrated oil bath
- Dual pump stirrer system
- Digital temperature control
- Oil tank capacity – 30 litres
- 6 off Individual stainless steel test cells
- Test sample holders
- 50-500 cm<sup>3</sup>/min glass flow meter
- Output flow rate meter
- 6 way switchable temperature indicator
- Test cell hour counter
- Certificate of calibration
- Product user manual
- CE declaration certificate
- 1 year return to base warranty

### OPTIONAL ANCILLARIES

- Heat transfer medium 30 ltrs

### WEIGHTS & DIMENSIONS: RR/TAA

Net Weight (kg)	75
Width (cm)	60
Depth (cm)	60
Height (cm)	65

# UNIVERSAL TESTING MACHINES M250

The **M250 Universal Testing Machine** is the smallest of the models offered by Ray-Ran within the product range. The small footprint single column machine has a range of 5N to 3KN and is used in all industries worldwide for materials testing, product testing, research and development and quality control applications. Fully automated by advanced computer technology the testing system with high precision control ensures simplicity in operation and highly accurate test results.

The machine is offered in two models, the standard **CT** and integrated **AT** range. The **CT Universal Testing Machine** uses feature-rich **WinTest™ Analysis** software for control and testing, with comprehensive on-board test methods that are compliant with all relevant industry standards including advanced, standard and complex multistage test procedures which are fully configurable and controlled using a standard PC interface. PC systems can be supplied or customers can utilise their own desktop computer or laptop to operate the machine.

The **AT Universal Testing Machine** is a stand-alone machine

which utilises the latest integrated touch screen technology and is fitted with an integrated industrial computer module comprising 1 GHz CPU with 256MB Ram, 40 GB Hard Drive with Windows XP operating, LAN, USB & RS232 ports.

The AT uses the feature-rich **WinTest™ Analysis** software for control and testing with comprehensive on-board test methods that are compliant with all relevant industry standards including advanced, standard and complex multistage test procedures.

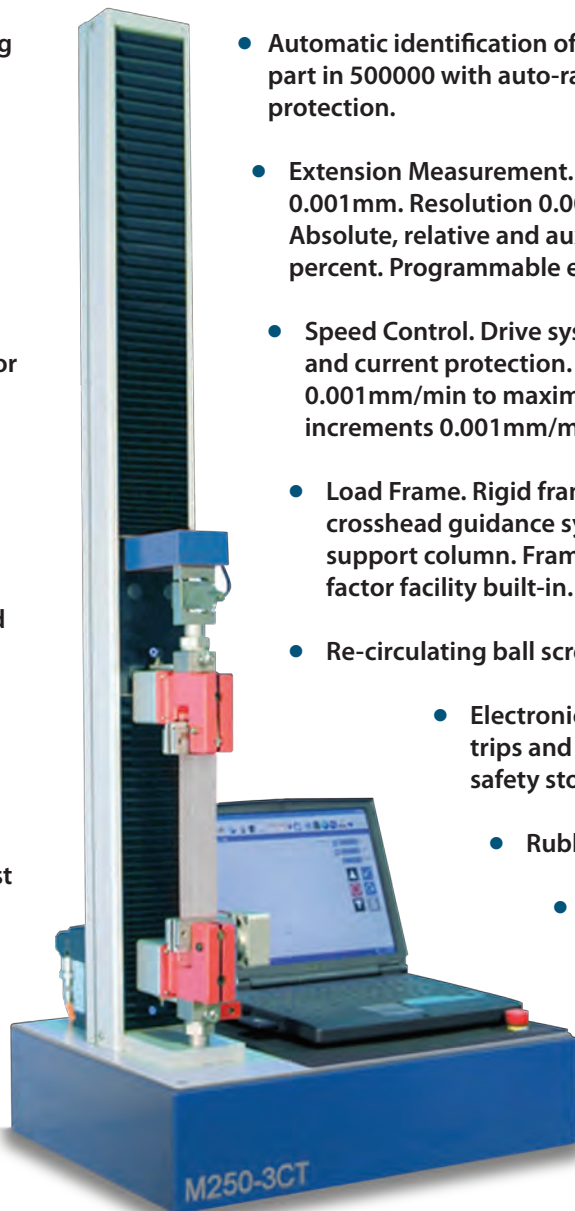
## THE STANDARD FEATURES OF THE CT AND AT MACHINES INCLUDE:

- Fully digital testing system with high precision control and accuracy, includes automated computer control of test methods giving simplicity of operation.
- High resolution auto ranging load cells with accuracies better than  $\pm 0.5\%$  down to 1/1000th of the load cell capacity.
- Automatic recognition and calibration of load cells and extensometers, with instant calibration check facility.
- 800% overload capability of load cells without damage.
- Small footprint design, giving economy of bench and floor space.





- High efficiency pre-loaded self cleaning ball screws for fast, quiet testing. Fitted with sealed for life lubricated end bearings.
- Crosshead guidance system providing precise alignment and smooth running.
- Precision crosshead control via digital AC servo drive and brushless servo motor giving maintenance free operation and 4,000,000 steps per revolution positional control.
- High speed data collection systems for up to 4 synchronous channels.
- 6 I/O channels for additional devices such as extensometers, micrometers, calipers, balances etc.
- High stiffness loading frames with solid specialised steel crossheads and rigid extruded support columns with T-slots for accessory mounting.
- Overload, over travel and impact protection.
- Telescopic covers giving additional protection for ball screws against dust and testing debris.
- Extensive range of grips and fixtures for tension, compression, flexural, shear, peel and product testing etc.
- A wide range of contacting and non-contacting extensometers is available including laser and video models.



- Force Measurement Universally Calibrated, better than Grade 0.5 EN 7500-1, DIN 51221 ASTM E-4. AFNOR A03-501. Range 0.4% to 100% minimum.
- Automatic identification of load cell. Resolution 1 part in 500000 with auto-ranging. Electronic load cell protection.
- Extension Measurement. Full frame length to 0.001mm. Resolution 0.001 min. Accuracy 0.01mm. Absolute, relative and auxiliary modes mm and percent. Programmable extension limits.
- Speed Control. Drive system temperature and current protection. Positional jog speed 0.001mm/min to maximum. Speed setting increments 0.001mm/min.
- Load Frame. Rigid frame, using dual slide crosshead guidance system and rigid extruded support column. Frame stiffness 5kN/mm plus K factor facility built-in.
- Re-circulating ball screw with bellows.
- Electronic limit trips, total travel trips and customer programmable safety stops.
- Rubber mat front protection.
- Remote connection self diagnostics software and registration. Giving direct connection of your machine for remote service, on-line training, software upgrades, new test methods uploaded, etc

## TECHNICAL SPECIFICATION

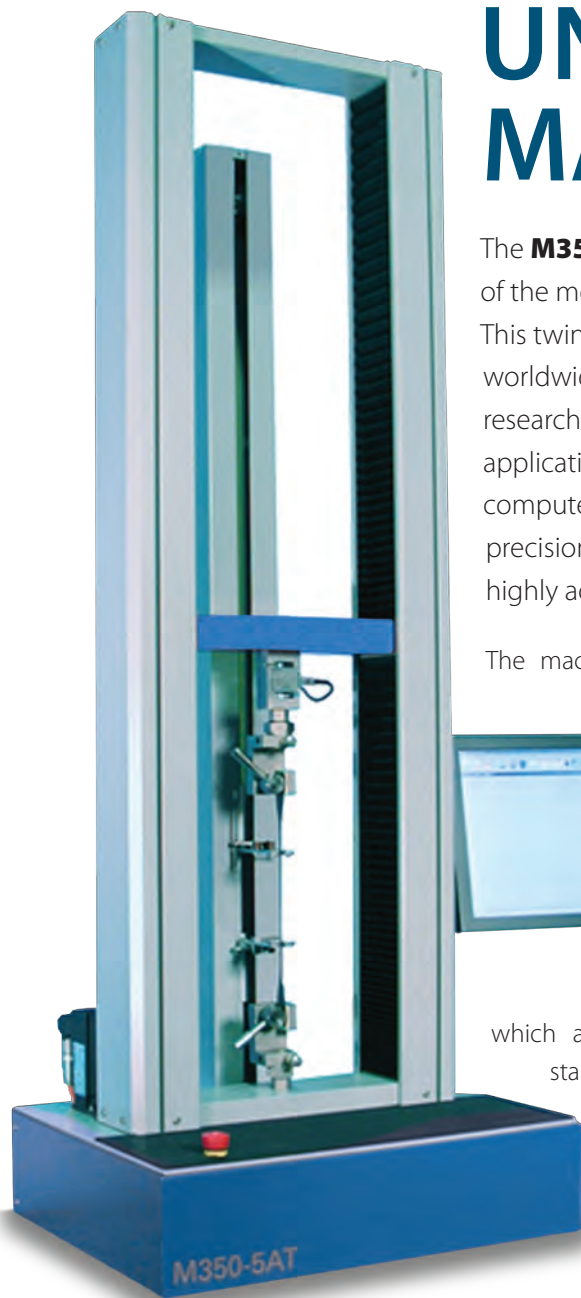
- Single column machine
- A/C servo drive
- Machine Capacity 5N - 3kN
- Auto Load cell identification
- Load cell protection
- High resolution load cell
- User selectable load and travel limits
- Speed Range 0.001 to 1000mm/min in steps of 0.001mm/min
- Crosshead Travel (excluding grips) 1000mm
- Telescopic lead screw covers
- Throat 200mm
- Vertical space 1170mm
- Direct connection to extensometers
- **WinTest™ Analysis** operating software
- RS232 output for PC
- Supply voltage 200/240V AC or 100/120V AC at 50 or 60 Hz
- Power 0.3kW
- Product user manual
- CE declaration certificate
- 1 year return to base warranty

## OPTIONAL ANCILLARIES

- Range of manual grips
- Range of pneumatic grips with foot switch
- Compression platens, round or square
- 3 point bending fixture 20 – 300mm span
- Load cell up to 3kN
- Clip on Extensometer for elastomers or metals
- Wide frame extension
- Height extension
- Remote connection software

## WEIGHTS & DIMENSIONS: RR/UTM M250

Net Weight (kg)	92
Width (cm)	59
Depth (cm)	45
Height (cm)	148



# UNIVERSAL TESTING MACHINES M350

The **M350 Universal Testing Machine** is one of the most versatile models offered by Ray-Ran. This twin column machine is used in all industries worldwide for materials testing, product testing, research and development and quality control applications. Fully automated by advanced computer technology the testing system with high precision control ensures simplicity in operation and highly accurate test results.

The machine is offered in two models, the standard **CT** and integrated **AT** range. The **CT Universal Testing Machine** uses feature-rich **WinTest™ Analysis** software for control and testing, with comprehensive on-board test methods that are compliant with all relevant industry standards including advanced, standard and complex multistage test procedures which are fully configurable and controlled using a standard PC interface. PC systems can be supplied or customers can utilise their own desktop computer or laptop to operate the machine.

The **AT Universal Testing Machine** is a stand-alone machine which utilises the latest integrated touch screen technology and is fitted

with an integrated industrial computer module comprising 1 GHz CPU with 256MB Ram, 40 GB Hard Drive with Windows XP operating, LAN, USB & RS232 ports.

The AT uses the feature-rich **WinTest™ Analysis** software for control and testing with comprehensive on-board test methods that are compliant with all relevant industry standards including advanced, standard and complex multistage test procedures.

## THE STANDARD FEATURES OF THE CT AND AT MACHINES INCLUDE:

- Fully digital testing system with high precision control and accuracy, includes automated computer control of test methods giving simplicity of operation.
- High resolution auto ranging load cells with accuracies better than  $\pm 0.5\%$  down to 1/1000th of the load cell capacity.
- Automatic recognition and calibration of load cells and extensometers, with instant calibration check facility.
- 800% overload capability of load cells without damage.
- Small footprint design, giving economy of bench and floor space.
- High efficiency pre-loaded self cleaning ball screws

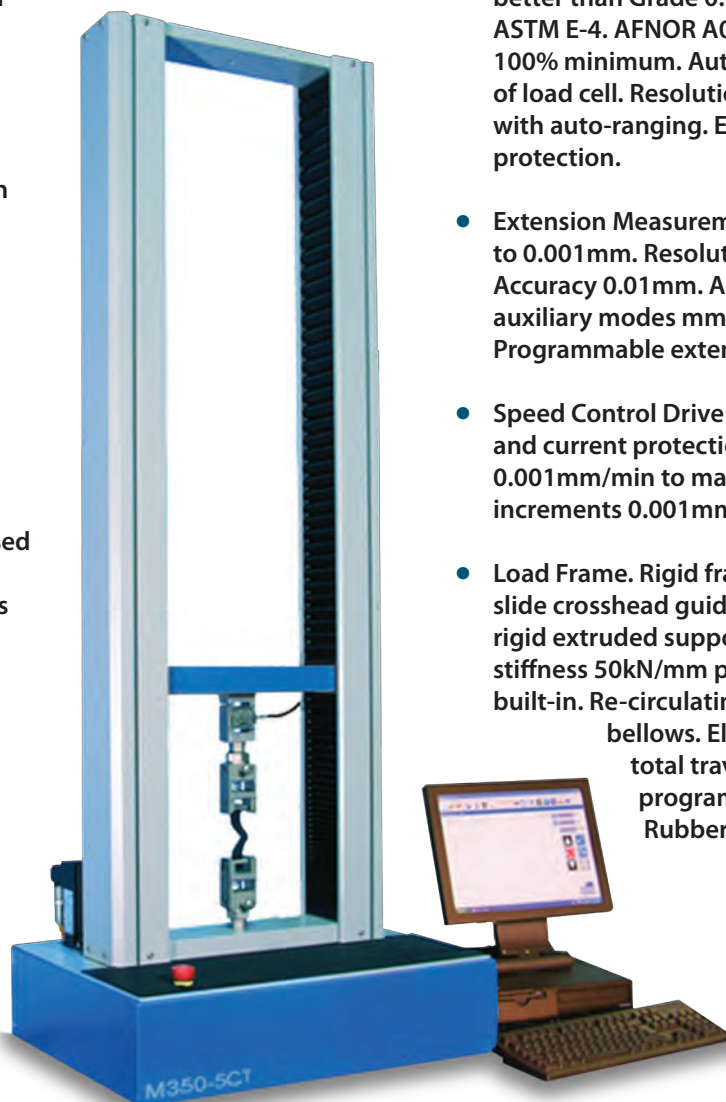


for fast, quiet testing. Fitted with sealed for life lubricated end bearings.

- Crosshead guidance system providing precise alignment and smooth running.
- Precision crosshead control via digital AC servo drive and brushless servo motor giving maintenance free operation and 4,000,000 steps per revolution positional control.
- High speed data collection systems for up to 4 synchronous channels.
- 6 I/O channels for additional devices such as extensometers, micrometers, callipers, balances etc.
- High stiffness loading frames with solid specialised steel crossheads and rigid extruded support columns with T-slots for accessory mounting.
- Overload, over travel and impact protection.
- Telescopic covers giving additional protection for ball screws against dust and testing debris.
- Extensive range of grips and fixtures for tension, compression,

flexural, shear, peel and product testing etc.

- A wide range of contacting and non-contacting extensometers is available including laser and video models.
- Force Measurement Universally Calibrated, better than Grade 0.5 EN 7500-1, DIN 51221 ASTM E-4. AFNOR A03-501. Range 0.4% to 100% minimum. Automatic identification of load cell. Resolution 1 part in 500000 with auto-ranging. Electronic load cell protection.
- Extension Measurement Full frame length to 0.001mm. Resolution 0.001 min. Accuracy 0.01mm. Absolute, relative and auxiliary modes mm, inch and percent. Programmable extension limits.
- Speed Control Drive system temperature and current protection. Positional jog speed 0.001mm/min to maximum. Speed setting increments 0.001mm/min.
- Load Frame. Rigid frame, using dual slide crosshead guidance system and rigid extruded support column. Frame stiffness 50kN/mm plus K factor facility built-in. Re-circulating ball screw with bellows. Electronic limit trips, total travel trips and customer programmable safety stops. Rubber mat front protection.



## TECHNICAL SPECIFICATION

- Twin column machine
- A/C servo drive
- Machine Capacity 5N - 20kN
- Auto Load cell identification
- Load cell protection
- High resolution load cell
- User selectable load and travel limits
- Speed Range mm/min 0.001 to 2000\*
- Max speed at full load mm/min 500- 2000\*
- Crosshead Travel (excluding grips) 1100mm
- Telescopic lead screw covers
- Throat 295mm
- Vertical space 1275mm
- Direct connection to extensometers
- **WinTest™ Analysis** operating software
- RS232 output for PC
- Supply voltage 200/240V AC or 100/120V AC at 50 or 60 Hz
- Power 0.45kW
- Product user manual
- CE declaration certificate
- 1 year return to base warranty

\*dependant on model & load cell size

## OPTIONAL ANCILLARIES

- Range of manual grips
- Range of pneumatic grips with foot switch
- Compression platens, round or square
- 3 point bending fixture 20 – 300mm span
- Load cell up to 20KN
- Clip on Extensometer for elastomers or metals
- Wide frame extension
- Height extension
- Remote connection software

## WEIGHTS & DIMENSIONS: RR/UTM M350

Net Weight (kg)	190
Width (cm)	59
Depth (cm)	45
Height (cm)	158

# UNIVERSAL TESTING MACHINES M500

Power and affordability has been brought together in the **M500 Universal Testing Machine** offered by Ray-Ran. This powerful twin column machine is used in all industries worldwide for materials testing, product testing, research and development and quality control applications. Fully automated by advanced computer technology the testing system with high precision control ensures simplicity in operation and highly accurate test results.



The machine is offered in two models, the standard **CT** and integrated **AT** range. The **CT Universal Testing Machine** uses feature-rich **WinTest™ Analysis** software for control and testing, with comprehensive on-board test methods that are compliant with all relevant industry standards including advanced, standard and complex multistage test procedures which are fully configurable and controlled using a standard PC interface. PC systems can be supplied or customers can utilise their own desktop computer or laptop to operate the machine.

The **AT Universal Testing Machine** is a stand-alone machine which utilises the latest integrated touch screen technology and is fitted with an integrated industrial computer module comprising 1 GHz CPU with 256MB Ram, 40 GB Hard Drive with Windows XP operating, LAN, USB & RS232 ports.

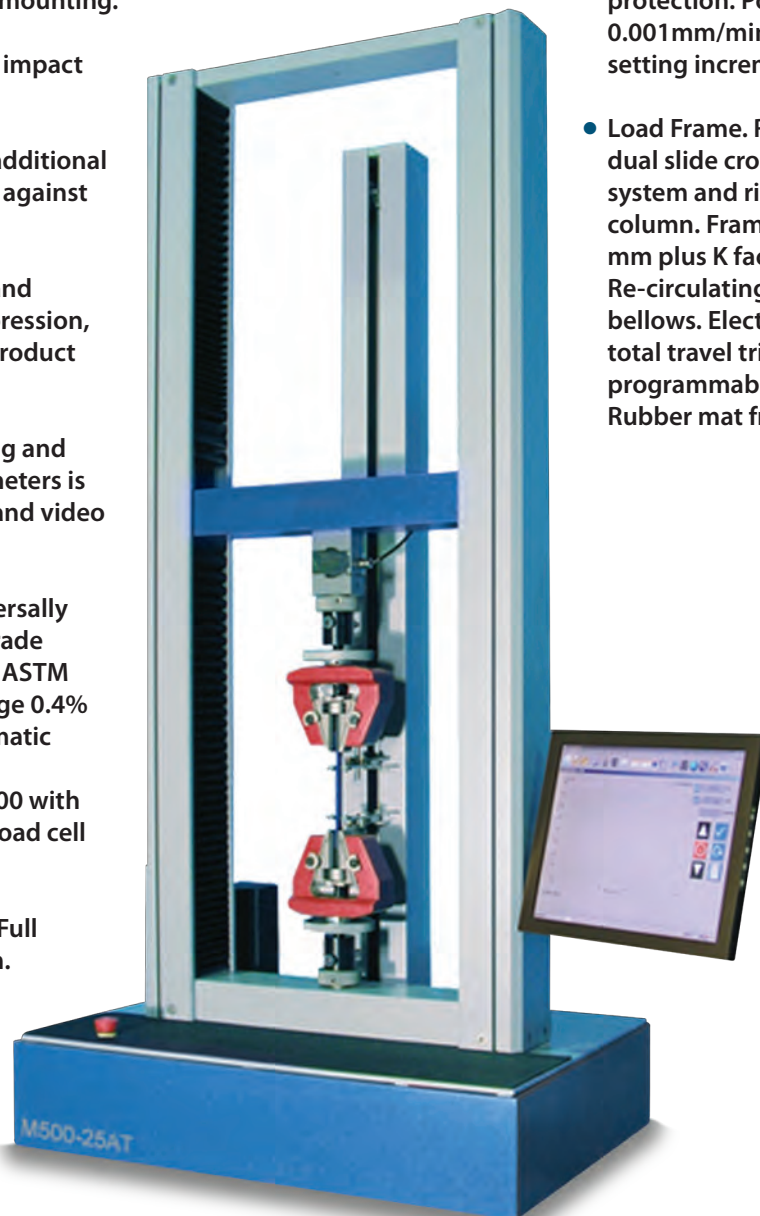
The **AT** uses the feature-rich **WinTest™ Analysis** software for control and testing with comprehensive on-board test methods that are compliant with all relevant industry standards including advanced, standard and complex multistage test procedures.

## THE STANDARD FEATURES OF THE **CT** AND **AT** MACHINES INCLUDE:

- Fully digital testing system with high precision control and accuracy, includes automated computer control of test methods giving simplicity of operation.
- High resolution auto ranging load cells with accuracies better than  $\pm 0.5\%$  down to 1/1000th of the load cell capacity.
- Automatic recognition and calibration of load cells and extensometers, with instant calibration check facility.
- 800% overload capability of load cells without damage.
- Small footprint design, giving economy of bench and floor space.
- High efficiency pre-loaded self cleaning ballscrews for fast, quiet testing. Fitted with sealed for life lubricated end bearings.
- Crosshead guidance system providing precise alignment and smooth running.
- Precision crosshead control via digital AC servo drive and brushless servo motor giving maintenance free operation and 4,000,000 steps per revolution positional control.
- High speed data collection systems for up to 4 synchronous channels.
- 6 I/O channels for additional devices such as extensometers, micrometers, callipers, balances etc.



- High stiffness loading frames with solid specialised steel crossheads and rigid extruded support columns with T-slots for accessory mounting.
- Overload, over travel and impact protection.
- Telescopic covers giving additional protection for ball screws against dust and testing debris.
- Extensive range of grips and fixtures for tension, compression, flexural, shear, peel and product testing etc.
- A wide range of contacting and non-contacting extensometers is available including laser and video models.
- Force Measurement Universally Calibrated, better than Grade 0.5 EN 7500-1, DIN 51221 ASTM E-4. AFNOR A03-501. Range 0.4% to 100% minimum. Automatic identification of load cell. Resolution 1 part in 500000 with auto-ranging. Electronic load cell protection.
- Extension Measurement Full frame length to 0.001mm. Resolution 0.001 min. Accuracy 0.01mm. Absolute, relative and auxiliary modes mm, inch and percent. Programmable extension limits.



- Speed Control Drive system temperature and current protection. Positional jog speed 0.001mm/min to maximum. Speed setting increments 0.001mm/min.
- Load Frame. Rigid frame, using dual slide crosshead guidance system and rigid extruded support column. Frame stiffness 100kN/mm plus K factor facility built-in. Re-circulating ball screw with bellows. Electronic limit trips, total travel trips and customer programmable safety stops. Rubber mat front protection.

## TECHNICAL SPECIFICATION

- Twin column machine
- A/C servo drive
- Machine Capacity 5N - 100kN
- Auto Load cell identification
- Load cell protection
- High resolution load cell
- User selectable load and travel limits
- Speed Range mm/min 0.001 to 1000\*
- Max speed at full load mm/min 500-1000\*
- Crosshead Travel (excluding grips) 1059mm
- Telescopic lead screw covers
- Throat 420mm
- Vertical space 1300mm
- Direct connection to extensometers
- **WinTest™ Analysis** operating software
- RS232 output for PC
- Supply voltage 200/240V AC or 100/120V AC at 50 or 60 Hz
- Power 1.2kW
- Product user manual
- CE declaration certificate
- 1 year return to base warranty

\*dependant on model & load cell size

## OPTIONAL ANCILLARIES

- Range of manual grips
- Range of pneumatic grips with foot switch
- Compression platens, round or square
- 3 point bending fixture 20 – 300mm span
- Load cell up to 20KN
- Clip on Extensometer for elastomers or metals
- Wide frame extension
- Height extension
- Remote connection software

## WEIGHTS & DIMENSIONS: RR/UTM M500

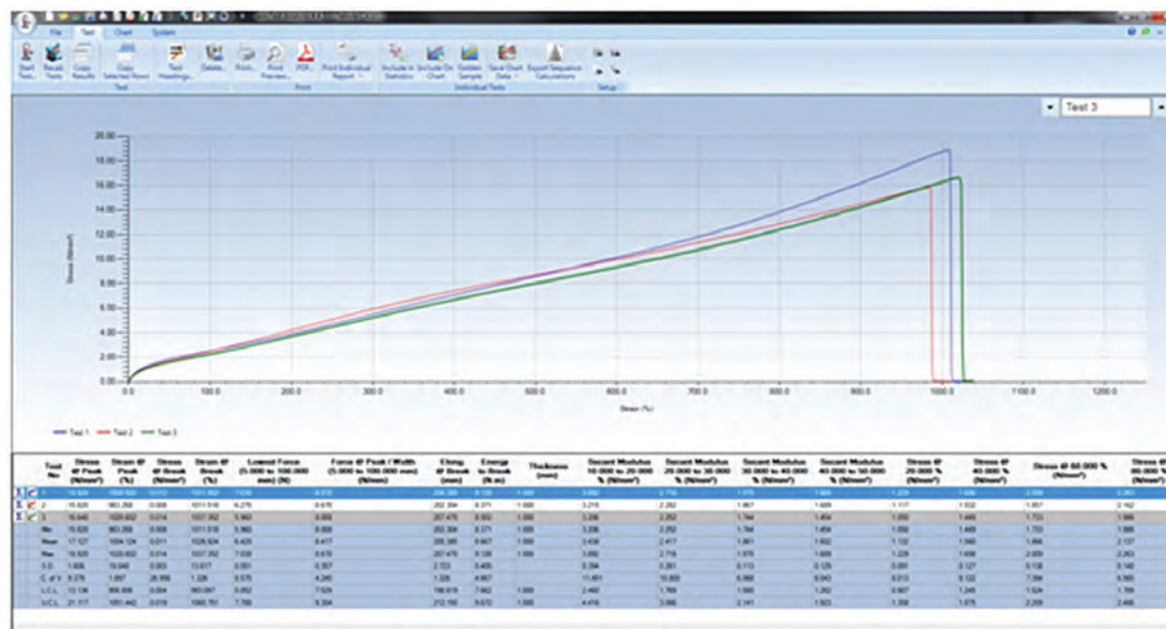
Net Weight (kg)	376
Width (cm)	76
Depth (cm)	51
Height (cm)	158

# WINTEST™ ANALYSIS

## THE ULTIMATE SOFTWARE PACKAGE IN FORCE MEASUREMENT

**WinTest™ Analysis** is the advanced software suite supplied with the Ray-Ran range of **Universal Testing Machines**. It is a multi-functional and fully customisable software package that supports all industry standards including ISO, ASTM and BS EN specifications. The software covers tensile, compression, peel, shear, tear, cyclic, creep and multi stage testing. It includes a wide range of industry standard test methods and the facility to create and store an unlimited number of bespoke test methods. Additional flexibility is provided by user-defined multistage step testing for highly specialised testing requirements and also includes an extensive range of calculations applicable to many industries, including all variations of force, elongation, stress and strain values and many others.

The virtual control panel allows the operator full control of all tester functions and the ability to conduct simple tests manually as well as providing easy access to stored test methods, system configuration and diagnostics. Test results are displayed in real time on the auto scaling graph and in tabular format with each test in the batch highlighted in a different colour. The software also offers automated storage of all test data and test results.



Test reports are easily generated and test data can be transferred directly to other software applications for enhanced report generation, SPC trend analysis or laboratory manager reports for example. They can be exported to Microsoft Word and/or Excel to provide you with full editing features and copy and paste capability to produce presentation-quality test reports, charts or test data in spreadsheet format. Including company details and logos to complete that professional look.

Test reports are easily converted into Adobe PDF files

so you can simply email them as a PDF attachment or send them as a Microsoft Word document or an Excel file. Test data can also be exported in ASCII delimited format to Microsoft Excel or other spreadsheet software using search criteria such as References, Start Date and End Date. It is also possible to export Minimum, Mean and Maximum results data based on a periodic selection (daily, weekly, monthly etc.) to highlight trends over a specified interval.

The integrated HTML help file with added search function includes simple explanations of machine



operation, test result descriptions and graphical Flash representation of tests and test calculations. This feature also enables you to view graphically how specific test results are calculated to help you verify the correct selection of test calculations.

## RESULTS FEATURES INCLUDE:

- Comprehensive library of industry standard calculations.
- Configurable statistics summary for each test report.
- Customised test calculations.
- Visual Pass/Fail.
- Sequential calculations to take measurement at set intervals for long term tests etc.
- Custom statistics can be generated for selected calculation.
- Retrospective analysis of all test calculations.
- Calculate results on pre-defined test regions.
- Comments field and custom columns available for each test series and for individual tests.
- User-friendly test data backup can be configured for periodic reminders.
- Free backup / archive viewer program available

## REPORT FEATURES INCLUDE:

- Fully-configurable test reports
- User-defined header and footer on test reports.

- Generate test reports in PDF format for email etc.
- Auto-print and preview option.
- Report transfer into Microsoft Excel™ and Microsoft Word™.
- Import and export of test definitions in XML format
- Export test results in ASCII format
- Export raw curve data

## GRAPH FEATURES INCLUDE:

- Pass/Fail tolerance bands
- Display of best fit straight line in the elastic region, for calculation of E modulus, proof stress etc.
- Golden sample, a test curve can be selected as a reference and tolerance bands can be set to provide an instant visual check that all subsequent tests are within tolerance.
- Event marking during real time plotting of test curve.
- Visual display of calculations.
- User defined annotations.
- Built-in drawing function.
- Visual event markers.
- User defined peaks and troughs.
- Show the current graph co-ordinates for the current mouse position

# WINTEST™ REPORTS

**WinTest™ Reports** is an enhancement to WinTest Analysis to add flexibility to data analysis and statistical reporting. The package provides a report generation capability that can include long-term statistics and control charts for all specified calculations. **WinTest™ Reports** can also be configured to display headings, titles, company logos, graphs, charts, pop-up menus and specific technical information.



# PRECISION THICKNESS GAUGE

The range of **Precision Thickness Gauge's** available from Ray-Ran have been specifically designed to quickly and accurately measure the thickness of a variety of materials including film, paper, board, foil, tissue and textiles. Operated via an intuitive touch screen interface, the instrument will allow the user to define batch size, dwell time & measuring speed simply and efficiently.

The instrument is operated via an integral colour touch screen display and features different measurement modes and user defined runtime routines which ensure total hands free operation during the test procedure. Physical test parameters can be factory configured according to international test standards or customer requirements.



Test measurement speed and dwell time are controlled by user define parameters. The instrument is linearised throughout its measurement range using a multi point calibration system and the flatness of the measurement head/anvil is  $<0.1\mu\text{m}$  with typical parallelism of  $<1\mu\text{m}$ .

Measurements made using the FT3 thickness gauge can be exported to Microsoft Excel via the RS232 connector using the interface software. All measured and calculated parameters are transferred along with the date / time stamp, instrument serial number and calibration date. Full test statistics can be easily viewed or printed to label for easy documentation control.

## METHODS OF TESTING INCLUDE:

- **STANDARD TEST:**  
Full statistical analysis of up to 500 readings.
- **BATCH TEST:**  
Calculates the thickness difference between two measurement sets, used to assess the thickness of coatings, adhesives or sample batches.
- **STANDARD TARE TEST:**  
Automatically tares the instrument before each test using user defined conditions.

INSTRUMENTS CAN BE CONFIGURED TO MEET ANY OF THE STANDARDS LISTED BELOW:

### PLASTIC FILM

BS 2782-6, DIN 53370, ISO 4593, ASTM D6988

### PAPER & BOARD

ISO 534, ISO 3034, DIN 53105, BS EN 20534, BS 4817, BS EN 12625-3, BS 7387, TAPPI T, SCAN P7, SCAN P31, SCAN P47, FEFCO No 3

### TEXTILE

ISO 5084, ISO 2589, ASTM D1777, ASTM D5199, ASTM F36

### FLOOR COVERINGS

EN428

### FLEXIBLE PACKAGING

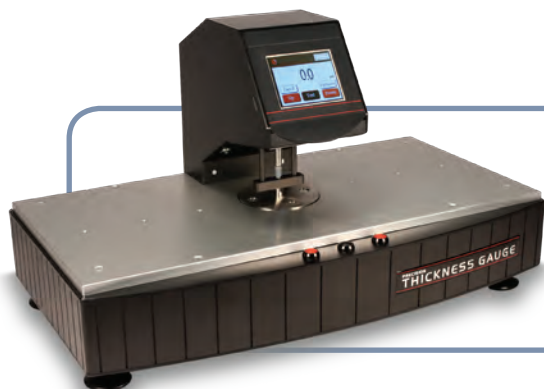
ASTMF2251

### TAPE

DIN EN 1942, ASTM D3652



## MODELS AVAILABLE



### FT3 - STANDARD INSTRUMENT

With fixed pressure, factory configured to meet a single test standard or specification of your choice. Can be extended to optional 19mm measuring range

### FT3-V - VARIABLE INSTRUMENT

Test pressure is varied by adding additional weights to the instrument platform. Factory configured measurement head size. One external weight is included to achieve compliance to a second measurement standard or assess material compressibility. Additional external weights can be applied to increase measurement pressure up to 4kg total. Can be extended to optional 19mm measuring range



### FT3-U - ULTRA HIGH PRECISION INSTRUMENT

Fixed pressure configured to meet a single test standard or specification. Enhanced resolution of 0.01m for applications requiring ultra high precision. Factory configured measurement mass between 50g and 500g available. Measurement Head: 25.5mm radius domed. Custom radius domed heads available on request.



## PRECISION THICKNESS GAUGE (RR/PTG)

### TECHNICAL SPECIFICATION

- Resolution: 0.1  $\mu\text{m}$  (0.01  $\mu\text{m}$  on FT3-U)
- Repeatability: Better than 0.4  $\mu\text{m}^*$
- Reproducibility: Better than 0.8  $\mu\text{m}^*$
- Measurement Range: 0 – 4000  $\mu\text{m}$
- 0 – 19000  $\mu\text{m}$  extended range instrument also available
- Output: RS232
- Power: 110V/220V 50Hz/60Hz
- User programmable number of readings, dwell time and down speed
- Metric or imperial units
- Easy to use touch screen / integrated software
- Flatness of measurement head/anvil <0.1 $\mu\text{m}$ , typical parallelism <1 $\mu\text{m}$
- UKAS traceable calibration certificate, 2000 and 500  $\mu\text{m}$  calibrated check gauge
- Product user manual
- CE declaration certificate
- 1 year return to base warranty

\* **dependant on model**

### OPTIONAL ANCILLARIES

- Results printer
- Hands free foot switch

### WEIGHTS & DIMENSIONS: RR/PTG

Net Weight (kg)	10
Width (cm)	30
Depth (cm)	29
Height (cm)	29

# INDENTATION HARDNESS APPARATUS

For accurately checking the shore hardness of a wide range of elastomers and plastic materials, the Ray-Ran range of **Durometers** are simply hard to beat. Due to the fact that material hardness is a key characteristic of an elastomer and one which can be related to important material properties, it is beneficial to be able to accurately measure the material hardness of a supplied product making them ideal for product design and quality control inspection.

Offered in analogue or digital scales, each durometer can be used hand held or fitted to the Ray-Ran bench mounted Lever Operated DurometerStand. Each durometer available utilizes the Shore method of hardness measurement and features a spring-loaded indenter module which



is pressed down squarely on the surface of the material to be measured resulting in its shore hardness.

The unique interchangeable modules allow for a wide and useful range of the Shore harnesses scales to be measured on one instrument. Depending on the material being tested, hardness scales are available to Shore A, B, C, D, DO and OO with each interchangeable module supplied calibrated to the durometer head. The only exception to this interchangeability is the softest Shore OO range due to its very low indenter loads.

The models offered within the Ray-Ran range are the STD226 Digital Durometer and the STD227 Analogue Durometer. Each durometer comes with its own calibration certificate tested to the relevant module, protective carry case, product user manual and 12 month return to base warranty.

## TECHNICAL SPECIFICATION

### Model STD 226 Digital Durometer

- Resolution - half of one degree Shore hardness scale
- Easy to use - hand held
- Sturdy, accurate and reliable
- BCD output facility
- Uses 1 x SR44 flat battery
- Multiple Modules with the same instrument head
- Supplied in convenient storage/protective case

### Model STD 227 Analogue Durometer

- Resolution - one degree Shore hardness scale
- Supplied complete with tolerance settings
- Optional maximum hand
- Multiple Modules with the same instrument head
- Supplied in convenient storage/protective case

## OPTIONAL ANCILLARIES

- Lever operated bench stand
- Set of 6 coloured rubber reference blocks (shore A only)
- Shore A Scale ASTM D 2240, ISO 7619 & 868, DIN 53505
- Shore B Scale ASTM D 2240
- Shore C Scale ASTM D 2240
- Shore D Scale ASTM D 2240, ISO 7619 & 868, DIN 53505
- Shore DO Scale ASTM D 2240
- Shore O Scale ASTM D 2240

## WEIGHTS & DIMENSIONS: INDENTATION HARDNESS APPARATUS

	STD226	STD227
Net Weight (kg)	0.3	0.22
Width (cm)	6.5	3.8
Depth (cm)	2.5	2.3
Height (cm)	15	13.5



## LEVER OPERATED DUROMETER BENCH STAND (RR/DBS)

### TECHNICAL SPECIFICATION

- Can be fitted with STD227 and STD226 durometers
- Easy to use lever operated
- Large sample lever platform
- Adjustable durometer height
- Set of test weights supplied
- "V" block for cylindrical samples
- Product user manual
- 12 month return to base warranty

### OPTIONAL ANCILLARIES

- STD226 Durometer
- STD227 Durometer

### WEIGHTS & DIMENSIONS: RR/DBS

Net Weight (kg)	5
Width (cm)	35
Depth (cm)	25
Height (cm)	45

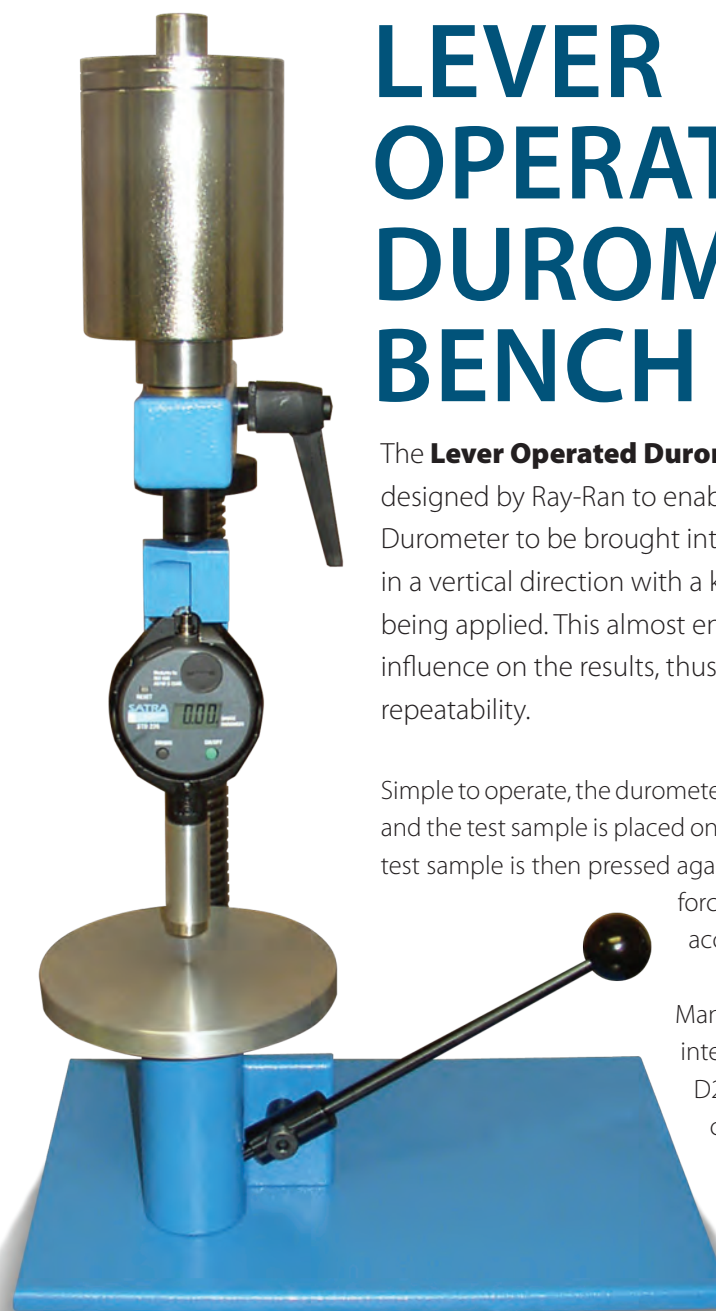
## SAMPLE & COMPONENT TESTING

# LEVER OPERATED DUROMETER BENCH STAND

The **Lever Operated Durometer Bench Stand** has been designed by Ray-Ran to enable the simple mounting of a Durometer to be brought into contact with a test sample in a vertical direction with a known constant loading force being applied. This almost entirely eliminates any operator influence on the results, thus ensuring greater accuracy and repeatability.

Simple to operate, the durometer is loaded with a specified static load and the test sample is placed on the lever operated surface plate. The test sample is then pressed against the durometer and the constant force of the static load applied ensuring accurate repeatable test results.

Manufactured to comply with international testing methods ASTM D2240 and DIN 53505, the apparatus can accommodate both the STD226 and STD227 durometers. The bench stand is supplied complete with all test weights to the relevant test standards an "V" block for testing polymer tube samples.



**RAY-RAN**

**DUROMETER  
BENCH STAND**

# DEMONSTRATION FACILITY

Ray-Ran Test Equipment is very pleased to welcome customers to its purpose built onsite demonstration facility based in Nuneaton.

The facility is ideal for product verification and validation purposes which lets customers get a "hands on" experience of the equipment of interest to ensure their future investment meets their requirements.

For customers who have already purchased equipment from Ray-Ran the onsite demonstration facility also provides an excellent place to train your personnel. Our fully trained technicians ensure your operators are fully conversant with all the technical aspects of the equipment and understand the operation procedures ensuring accurate test results maximizing the return on your investment.

If an onsite demonstration is not possible simply send us your test samples and we will conduct a small batch test on the equipment of interest to verify the apparatus meets your testing requirements.

The following products are always available for demonstration. For other products, please check in advance as they may be subject to a lead time.

- Pendulum Impact and Puncture Tester
- Melt Flow Indexer
- Pneumatic and Hand Cutting Presses
- CNC1 Milling Machines
- HDT/Vicat
- Test Sample Moulding Apparatus
- Density Balance
- Density Gradient Column
- Apparent Bulk Density
- Hardness Testers
- Coefficient of Friction Tester
- Sample Notching Cutter
- Falling Dart

Based within a short distance of Birmingham Airport, Train and Motorway routes, Ray-Ran Test Equipment is very accessible to many UK and European customers. If your journey or visit requires an overnight stay, Ray-Ran can organise local hotel accommodation if required.

If you feel this facility would be beneficial to you please contact Ray-Ran to arrange your visit.

WE LOOK FORWARD TO WELCOMING YOU TO RAY-RAN TEST EQUIPMENT LTD.

DEMONSTRATION  
FACILITY



# SERVICE & CALIBRATION

Ray-Ran recommend a regular service and calibration programme for your testing equipment after purchase to maintain their accuracy and reliability. All service and calibration procedures are conducted by skilled technicians with the most up to date equipment available ensuring your apparatus fully complies with International Testing Standards. Calibrations are usually conducted on a 24hr turnaround basis ensuring limited downtime and expense to the customer. Each machine is supplied with a Certificate of Calibration which is your guarantee of our competence and of the continuing accuracy of your instrumentation.

# REPAIRS

In the event that your equipment breaks down or develops a fault Ray-Ran offer a complete repair program. Conducted by fully skilled technicians the work will include fault diagnosis followed by a plan of action to make the equipment fully functional. Ray-Ran will notify you of all the costs involved prior to work being carried out and all repairs are covered with a 12 month warranty.

# COMMITMENT TO QUALITY

Ray-Ran Test Equipment Ltd is an ISO 9001:2008 UKAS accredited company and is proud of its record in supplying high quality products to its customers. The Company's policy of commitment and dedication to support its customers ensures Ray-Ran remains the world's leader in supplying polymer and materials testing equipment.

**SERVICE AND  
CALIBRATION**

TESTING INSTRUMENTS  
HIGH PRECISION TESTING INSTRUMENTATION

SERVICE AND CALIBRATION  
WORLDWIDE INSTALLATION, MAINTENANCE  
AND CALIBRATION SERVICE

TECHNICAL ASSISTANCE  
EXPERT ENGINEERING AND APPLICATIONS SUPPORT

PRODUCT DESIGN & DEVELOPMENT  
EXPERT ON SITE R & D, BESPOKE AND 1 OFF CAPABILITY.  
CONTACT US WITH YOUR REQUIREMENTS.



**RAY-RAN TEST EQUIPMENT LTD**

KELSEY CLOSE,  
ATTLEBOROUGH FIELDS  
INDUSTRIAL ESTATE  
NUNEATON,  
WARWICKSHIRE  
CV11 6RS

TEL: +44 (0)24 7634 2002  
FAX: +44 (0)24 7664 1670  
EMAIL: [polytest@ray-ran.com](mailto:polytest@ray-ran.com)  
WEB: [www.ray-ran.com](http://www.ray-ran.com)

